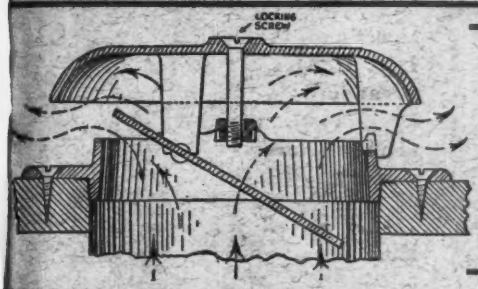
69

THE HEATING AND VENTILATING MAGAZINE

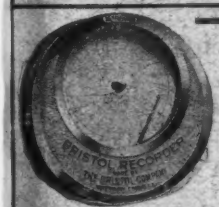
Vol. IX. No. 11. NEW YORK, NOVEMBER, 1912 Publication Office:
$1.00 a year. 10 cents a copy 1123 Broadway, New York

GURNEY HEATERS
FOR HEATING ANY DESCRIPTION OF BUILDING BY STEAM OR HOT WATER
THEY GIVE ENTIRE SATISFACTION · SEND FOR CATALOGUE.
GURNEY HEATER MANUFACTURING CO.
NEW YORK OFFICE 12 E 42ND ST. 188-200 FRANKLIN ST. BOSTON.

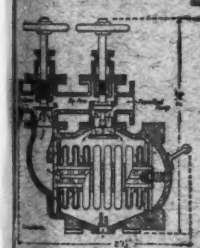


Knowles' Mushroom Ventilator
Placed on Floors of Theatres, Schools, Churches, Public Bldgs.
The *only* air controlling vent which *uniformly* distributes the air and without draught being felt. Opening adjusted and *locked.* Insist on the *Knowles'* Mushroom.
Mfd. by GEO. E. KNOWLES, 69 Beekman St., New York

THE "GLOBE" VENTILATOR
COPPER AND GALVANIZED IRON
SIMPLE, SYMMETRICAL, STORM PROOF, SUCCESSFUL
Model and Blue Print on Application
GLOBE VENTILATOR CO. TROY, N. Y.



TRADE MARK
BRISTOL'S
REG. U. S. PAT. OFFICE.
Electric Time Recorders or Operation Recorders are catalogued in new Bulletin No. 138 just off the press. Bulletin No. 139 on Bristol's Mechanical Time Recorders also just printed. Write for Bulletins No. 138 and No. 139.
THE BRISTOL CO., WATERBURY, CONN.



ROSS
FEED-WATER FILTERS
Will Keep Oil out of Your Boiler
Regulating Valves
For Water Steam Air
Ross Valve Mfg. Co. Troy, N. Y.
Ask for List of Users

IMPROVED WOOD STEAM PIPE CASINGS

FOR INSULATING UNDERGROUND STEAM PIPES
SIMPLE DURABLE EFFICIENT
WRITE
THE MICHIGAN PIPE CO., Bay City, Mich.

CROSBY Spring Seat Globe and Angle **VALVES** All parts interchangeable. All Parts Removable Tested for Highest Pressures **LEAK-PROOF** Crosby Steam Gage & Valve Co. Boston, New York, Chicago

Entered as second-class matter at the Post-Office in New York, N. Y. Copyright, 1912, by A. S. Armagnac

THE SPECIFICATION OF STEAM FITTING AND ENGINEERING SUPPLIES THAT BEAR THE "SIMMONS MARK" IS AN INSURANCE AGAINST DISSATISFACTION, A GUARANTEE OF EFFICIENCY AND HIGHEST STANDARD OF QUALITY. :: :: ::

The Rothchild Rotary Gate Blow-off Valve

is a marked improvement over any other class of Blow-off Valve in use. It is guaranteed to be the only valve ever made that will positively hold steam, water, ammonia, gas, oil or other fluids, hot or cold. It is specified for use on all big installations where only highly dependable fittings are required.

The Rothchild Rotary Gate Blow-off Valve

has been subjected to severe tests—tests that have proven conclusively their complete efficiency and depend ability. It is recognized as the "standard of the valve world" by most eminent engineers of the century.

Let us tell you more about it.

Simmons Locknut Plates

are made of cast iron and brass and designed for use in either concrete or wood flooring. On every installation they have met with the greatest satisfaction. The extended sleeve makes an absolutely watertight joint and prevents water from dripping to floor below when concrete floor is flushed. It protects wood flooring from superheated steam or hot-water pipes. The pipe sleeve can be made from any pipe you have on hand by threading at both ends. They are also adapted to side walls in gas, water or steam installations.

USED ON GOVERNMENT CONTRACTS

JOHN SIMMONS COMPANY

102-110 Center St., New York

THE HEATING AND VENTILATING MAGAZINE

1123 BROADWAY NEW YORK NOVEMBER, 1912

Health and Ventilation

A REMARKABLE CONTRIBUTION TO THE RECENT DISCUSSION OF THIS SUBJECT, DELIVERED BEFORE THE PHYSIOLOGICAL SECTION OF THE BRITISH ASSOCIATION.

BY LEONARD HILL, M. B., F. R. S.

Everyone thinks that he suffers in an ill-ventilated room owing to some change in the chemical property of the air, be it want of oxygen, or excess of carbon dioxide, the addition of some exhaled organic poison or the destruction of some subtle property by passage of the air over steam-coils, or other heating or conducting apparatus. We hear of "devitalized" or "dead" air, and of "tinned" or "potted" air of the battleships. The good effects of open-air treatment, sea and mountain air, are no less generally ascribed to the chemical purity of the air.

In reality, the health-giving properties are those of temperature, light, movement, and relative moisture of the surrounding atmosphere, and leaving on one side those gross chemical impurities which arise in mines and in some manufacturing processes, and the question of bacterial infection, the alterations in chemical composition of the air in buildings where people crowd together and suffer from the effects of ill-ventilation have nothing to do with the causation of these effects.

Satisfied with the maintenance of a specious standard of chemical purity, the public has acquiesced in the elevation of skyscrapers and the sinking of cavernous places of business. Many have thus become cave-dwellers, confined for most of their waking and sleeping hours in windless places, artificially lighted, monotonously warmed. The sun is cut off by the shadow of tall buildings and by smoke—the sun, the energizer of the world, the giver of all things which bring joy to the heart of man, the fitting object of worship of our forefathers.

The ventilating and heating engineer hitherto has followed a great illusion in thinking that the main objects to be attained in our dwellings and places of business are chemical purity of the air and a uniform draftless summer temperature.

VALUE OF CHANGES OF RATE IN THE TRANSFERENCE OF ENERGY

A sense organ is not stimulated unless there is a change of rate in the transference of energy; and this to be effectual must occur in most cases with considerable quickness. If a weak agent is to stimulate, its application must be abrupt. Thus the slow changes of barometric pressure on the body-surface originate no skin sensations, though such changes of pressure, if applied suddenly, are much above the threshold value for touch. A touch excited by constant mechanical pressure of slight intensity fades quickly below the threshold of sensation. Thus the almost unbearable discomfort which a child feels on putting on for the first time a "natural" wool vest fades away, and is no longer noticed with continual wear. Thomas à Becket soon

must have become oblivious to his hair-shirt, and even to its harbingers. It is not the wind which God tempers to the shorn lamb, but the skin of the lamb to the wind. The inflow of sensations keep us active and alive and all the organs working in their appointed functions.

The cutaneous sensations are of the highest importance. The salt and sand of wind-driven sea air particularly act on the skin and through it braces the whole body. Monotony of sedentary occupation and of an overwarm still atmosphere endured for long working hours destroys vigor and happiness, and brings about the atrophy of disuse.

CITY LIFE NOT NECESSARILY HARMFUL TO HEALTH

We hear a great deal of the degeneration of the race brought about by city life, but observation shows us that a drayman, navvy, or policeman can live in London or other big city, strong and vigorous, and no less so than in the country. The brain-worker, too, can keep himself perfectly fit if his hours of sedentary employment are not too long and he balances these by open-air exercise. The horses stabled, worked, and fed in London are as fine as any in the world; they do not live in windless rooms heated by radiators.

MEN INTENDED TO STAND VAGARIES OF CLIMATE

The hardy men of the North were evolved to stand the vagaries of climate —cold and warmth—a starved or full stomach have been their changing lot. The full stomach and the warm sun have expanded them in lazy comfort; the cold and the starvation have braced them to action. Modern civilization has withdrawn many of us from the struggle with the rigors of Nature; we seek for and mostly obtain the comfort of a full stomach and expand all the time in the warm atmosphere afforded us by clothes, wind-protected dwellings, and artificial heat—particularly so in the winter, when the health of the business man deteriorates. Cold is not comfortable, neither is hunger, therefore we are led to ascribe many of our ills to exposure to cold, and seek to make ourselves strong by what is termed good living.

BRACING EFFECT OF COLD AIR

I maintain that the bracing effect of cold is of supreme importance to health and happiness, that we become soft and flabby, and less resistant to the attacks of infecting bacteria in the winter, not because of the cold but because of our excessive precautions to preserve ourselves from cold; that the prime cause of "cold" or "chill" is not really exposure to cold, but to the over-heated and confined air of rooms, factories, and meeting-places. Seven hundred and eleven survivors were saved from the "Titanic" after hours of exposure to cold. Many were insufficiently clad and others wet to the skin. Only one died after reaching the "Carpathia," and he three hours after being picked up. Those who died perished from actual cooling of the body. Exposure to cold did not cause in the survivors the diseases commonly attributed to cold.

The conditions of great cities tend to confine the worker in the office all day, and to the heated atmosphere of club, moving picture show, or music-hall in the evening. The height of houses prevents the town dweller from being blown upon by the wind, and, missing the exhilarating stimulus of the cool, moving air, he repels the dull uniformity of existence by tobacco and by alcohol, or by indulgence in food, e. g., sweets, which are everywhere to his hand, and by the nervous excitement of business and amusement. He works, he eats, and is amused in warm, windless atmospheres, and suffers from a feeble circulation, a shallow respiration, a disordered digestion, and a slow rate of metabolism.

EXPERIMENTS SHOW CHEMICAL IMPORTANCE OF AIR NOT IMPORTANT

Experimental evidence is strongly in favor of my argument that the chemical purity of the air is of no importance. Analyses show that the oxygen in the worst-ventilated schoolroom, chapel, or theatre is never lessened by more than 1% of an atmosphere; the ventilation through chink and cranny, chimney, door and window, and the porous brick wall, suffices to prevent a greater diminution. So long as there is present a partial pressure of oxygen sufficient to change the

hæmoglobin of the venous blood into oxyhæmoglobin, there can arise no lack of oxygen.

At sea-level the pressure of oxygen in the pulmonary alveolar air is about 100 mm. Hg. Exposed to only half this pressure the hæmoglobin is more than 80% saturated with oxygen.

In noted health-resorts of the Swiss mountains the barometer stands at such a height that the concentration of oxygen is far less than in the more ventilated room. On the high plateau of the Andes there are great cities: Potosi with a hundred thousand inhabitants is 4,165 metres, and the partial pressure of oxygen there is about 13% of an atmosphere in place of 71% at sea-level; railways and mines have been worked up to altitudes of 14,000 or 15,000 ft. At Potosi girls dance half the night, and toreadors display their skill in the ring. On the slopes of the Himalayas shepherds take their flocks to altitudes of 18,000 ft. No disturbance is felt by the inhabitants or those who reach these great altitudes slowly and by easy stages. The only disability to a normal man is diminished power for severe exertion, but a greater risk arises from want of oxygen to cases of heart disease, pneumonia, and in chloroform anæsthesia at these high altitudes. The newcomer who is carried by the railway in a few hours to the top of Pike's Peak or the Andes may suffer severely from mountain sickness, especially on exertion, and the cause of this is want of oxygen. Acclimatization is brought about in a few days' time. The pulmonary ventilation increases, the bronchial tubes dilate, the circulation becomes more rapid. The increased pulmonary ventilation lowers the partial pressure of carbon dioxide in the blood and pulmonary air, and this contributes to the maintenance of an adequate partial pressure of oxygen.

Haldane and Douglas say that the percentage of red corpuscles and total quantity of the hæmoglobin increase, and maintain that the oxygen is actively secreted by the lung into the blood, but the method by which their determinations have been made has not met with unqualified acceptance. If waste products, which arise from oxygen want, alter the combining power of hæmoglobin, this alteration may not persist in shed blood; for these products may disappear when the blood is exposed to air. Owing to the combining power of hæmoglobin, the respiratory exchange and metabolism of an animal within wide limits is independent of the partial pressure of oxygen. On the other hand, the process of combustion is dependent, not on the pressure, but on the percentage of oxygen. Thus the aeroplanist may become seized with altitude sickness from oxygen want, while his gas engine continues to carry him to loftier heights.

WHY HIGH PERCENTAGE OF CO_2 IS NOT HARMFUL

The percentage of CO_2 in the worst ventilated room does not rise above 0.5%, or at the outside 1%. It is impossible that any excess of CO_2 should enter into our bodies when we breathe such air, for whatever the percentage of CO_2 in the atmosphere may be, that in the pulmonary air is kept constant at about 0.5 to 0.6% of an atmosphere—by the action of the respiratory centre. It is the concentration of CO_2 which rules the respiratory centre, and to such purpose as to keep the concentration both in the lungs and in the blood uniform; the only result from breathing air containing 0.5 to 1% of CO_2 is an appreciable increase in the ventilation of the lungs. The very same thing happens when we take gentle exercise and produce more CO_2 in our bodies.

At each breath we rebreathe into our lungs the air in the nose and large air-tubes (the dead-space air), and about one-third of the air which is breathed in by a man at rest in dead-space air. Thus, no man breathes in pure outside air into his lung. When a child goes to sleep with its head partly buried under the bed-clothes, and in a cradle confined by curtains, he rebreathes the expired air to a still greater extent; and so with all animals that snuggle together for warmth's sake. Not only the new-born babe sleeping against its mother's breast, but pigs in a sty, young rabbits, rats and mice clustered together in their nests, young chicks under the brooding hen, all alike breathe a far higher percentage than that allowed by the Factory Acts.

To rebreathe one's own breath is a

natural and inevitable performance, and to breathe some of the air exhaled by another is the common lot of men who, like animals, have to crowd together and husband their heat in fighting the inclemency of the weather.

The sanitarian says it is necessary to keep the CO_2 below 0.1%, so that the organic poisons may not collect to a harmful extent. The evil smell of crowded rooms is accepted as unequivocal evidence of the existence of such. He pays much attention to this and little or none to the heat and moisture of the air. The smell arises from the secretions of the skin, soiled clothes, etc. The smell is only sensed by and excites disgust in one who comes in from the outside air. He who is inside and helps to make the "fugg" is both wholly unaware of and affected by it. Flügge points out, with justice, that while we naturally avoid any smell that excites disgust and put us off our appetite, yet the offensive quality of the smell does not prove its poisonous nature. For the smell of the trade or food of one man may be horrible and loathsome to another not used to such.

Ventilation cannot get rid of the source of a smell, while it may easily distribute the evil smell through a house. As Pettenkofer says, if there is a dung-heap in a room, it must be removed. It is no good trying to blow away the smell.

TESTS TO SHOW RELATIVE EFFECT OF THE TEMPERATURE AND CHEMICAL PURITY OF THE ATMOSPHERE

To study the relative effect of the temperature and chemical purity of the atmosphere, I constructed a small experimental chamber of wood fitted with large glass observation windows and rendered air-tight.

On one side of the chamber were fixed two small electric heaters, and a tin containing water was placed on these in order to saturate the air with water vapor. On another side of the chamber was placed a large radiator through which cold water could be circulated when required, so as to cool the chamber. In the roof were fixed three electric fans, one big and two small, by means of which the air of the chamber could be stirred. The chamber held approximately 3 cubic metres of air.

In one class of experiments we shut within the chamber seven or eight students for about half an hour, and observed the effects of the confined atmosphere upon them. We kept them until the CO_2 reached 3 to 4%, and the oxygen had fallen to 17 to 16%. The wet-bulb temperature rose meanwhile to about 80° to 85°F., and the dry bulb a degree or two higher. The students went in chatting and laughing, but as the temperature rose, they ceased to talk and their faces became flushed and moist. To relieve the monotony of the experiment we have watched them trying to light a cigarette, and, puzzled by their matches going out, borrowing others, only in vain. They had not sensed the diminution of oxygen, which fell below 17%. Their breathing was deepened by the high percentage of CO_2, but no headache occurred in any of them from the short exposure.

Their discomfort was relieved to an astonishing extent by putting on the electric fans placed in the roof. While the air was kept stirred the students were not affected by the oppressive atmosphere. They begged for the fans to be put on when they were cut off. The same old stale air containing 3 to 4% CO_2 and 16 to 17% O_2 was whirled, but the movement of the air gave relief, because the air was 80° to 85°F. (wet bulb), while the air enmeshed in their clothes in contact with their skin was 98° to 99°F. wet bulb. If we outside breathed through a tube the air in the chamber we felt none of the discomfort which was being experienced by those shut up inside. Similarly, if one of those in the chamber breathed through a tube the pure air outside he was not relieved.

I have made observations on men dressed in the Fleuss rescue apparatus for use in mines, and exposed in a chamber to 120°F. dry bulb and 95°F. wet bulb. The skin temperature rises to the rectal temperature, and the pulse is greatly accelerated; that is, to 150, and there arises danger of heat stroke. The conditions are greatly relieved by interposing on the inspiratory tube of the apparatus a cooler filled with carbonic-acid snow. The cool inspired air lowers the frequency of the heart, and makes it possible for the men to do some work

at 95° F., wet bulb, and to endure the temperature for two hours.

EFFORTS SHOULD BE DIRECTED TOWARDS COOLING THE AIR IN CROWDED PLACES AND COOLING THE BODIES

I conclude, then, that all the efforts of the heating and ventilating engineers should be directed towards cooling the air in crowded places and cooling the bodies of the people by setting the air in motion by means of fans. In a crowded room the air confined between the body and the clothes of a people is almost warmed up to body temperature and saturated with moisture, so that cooling of the body by radiation, convection and evaporation becomes reduced to a minimum. The strain on the heat-regulating mechanism tells on the heart. The pulse is accelerated, the blood is sent in increased volume to the skin and circulates there in far greater volume, while less goes through the viscera and brain. As the surface temperature rises, the cutaneous vessels dilate, the veins become filled, the arteries may become small in volume, and the blood pressure low, the heart is fatigued by the extra work thrown upon it. The influence of the heat stagnation is shown by the great acceleration of the pulse when work is done and the slower rate at which the pulse returns to its former rate on resting.

The increased percentage of carbonic acid and diminution of oxygen which has been found to exist in badly-ventilated churches, schools, theatres, and barracks is such that it can have no effect upon the incidence of respiratory diseases and higher death-rate, which statistical evidence has shown to exist among persons living in crowded and unventilated rooms. The conditions of temperature, moisture and windless atmosphere in such places primarily diminishes the heat loss, and, secondarily, the heat production, i. e., the activity of the occupants, together with total volume of air breathed, oxygen taken in and food eaten. The whole metabolism of the body is thus run at a lower plane, and the nervous system and tone of the body is unstimulated by the monotonous, warm and motionless air. If hard work has to be done, it is done under conditions of strain. The number of pathogenic organisms is increased in such places, and these two conditions run together, diminished immunity and increased mass influence of infecting bacteria.

Effect of Smoke on Air and Light.

The smoke investigation being conducted by the Department of Industrial Research of the University of Pittsburgh has been made the subject of a special bulletin in which details are presented of the unusual scope of the undertaking. As has been announced, the investigation was made possible through the donation of a fund for the purpose by a resident of Pittsburgh. At the present time the investigation is being carried on by 25 specialists.

One of the most interesting aspects of the investigation is that of determining the effects of smoke and soot upon fogs, winds, temperature, sunlight and weather conditions generally, with particular reference to soft coal communities like Pittsburgh. The main topics covered by this section of the investigation are: atmospheric gases, suspended particles in the atmosphere, dust layers of the atmosphere, the surface dust layer, quantity of soot in the air of cities, limits of visibility, meteorological effects of the smoke cloud, effects of smoke upon condensation, city and country fogs, effect of smoke upon fog dissipation, duration of sunshine in cities, intensity of sunshine in cities, quantity of daylight in cities, effect of smoke clouds upon city temperatures, effect of smoke clouds upon maximum and minimum temperatures, and effect of smoke clouds upon the range of temperature.

One of the principal objects of the investigation is to provide a basis for calculating the increased cost of artificial illumination in Pittsburgh due to smoke in the atmosphere. This is a point that was brought out at a recent meeting of the heating engineers by Reginald Pelham Bolton, who showed how the cost involved in the necessity for increased illumination might easily be sufficient to make smoke abatement an economical proposition on that ground alone.

Another phase of the investigation relates to smoke and disease. In this connection a study is being made of the influences that this kind of air pollution has on certain forms of disease and upon the death rate. It has been found, for instance, that housekeepers frequently keep their windows shut for fear of soot, and thus contribute to the depressing effect of the smoke pall by shutting out the fresh air.

THE VANDERBILT EAST RIVER HOMES, EAST 77TH AND 78TH STREETS AND JOHN JAY PARK, NEW YORK.

Features of a Large Forced Hot Water Heating System

MECHANICAL HEATING, VENTILATION, POWER AND ELECTRICAL PLANT FOR THE VANDERBILT MODEL TENEMENTS, BETTER KNOWN AS "THE EAST RIVER HOMES."

BY RICHARD RUPPELL.

By referring to the master block plan, the general location and extent of these buildings can be ascertained. In reality there are four buildings operated and controlled from one central plant. This plant is situated underneath the main court.

Perhaps it might not be amiss, for the reader's information, to state that these buildings house in all 385 families, an apartment consisting of anywhere from two to five rooms and bath, and costing approximately $3.20 a week for two rooms and a bath, $4.20 for three rooms and a bath, and $5.30 for four rooms and a bath.

The buildings were built primarily to provide living accommodations of the highest sanitary character in every detail, and principally for those unfortunate families, a member of whom is afflicted with tuberculosis. Naturally these conditions largely influenced the design of the mechanical equipment which, through the generosity of Mrs. William K. Vanderbilt, was made possible.

It is needless to say that these buildings have proven their worth when it is considered that there is an occupancy of over 80% in a little less than nine months, and when it is considered that a great deal of judgment is exercised on the part of the executives in the final selection of tenants.

Heating.

No doubt the most important part of the mechanical equipments for these buildings, requiring the greatest consideration in the design, was the heating. There were two systems considered:

1. Overhead, one pipe, down-feed, two-pipe individual radiator connection, *low pressure steam heating with a dry circuit return.*

2. *Forced hot water circulation heating* on the overhead one-pipe, two-pipe individual connection system basis, controlled from the engine room.

WHY A HOT WATER HEATING SYSTEM WAS CHOSEN.

Of the two systems of heating (steam and hot water), the central system of

forced hot water circulation offered the following advantages:

(a) Economy in operation, averaging approximately between 15% and 20% less than a central steam heating plant. This is largely accountable for by the fact that a better control of the heating in the apartments is obtainable to meet the varying temperature conditions, the greatest economy of this type of system being obtainable during the milder weather periods, when only a slight modulated heat is necessary. This, of course, became a decidedly important factor, when it is considered that the class of tenant occupying these apartments are

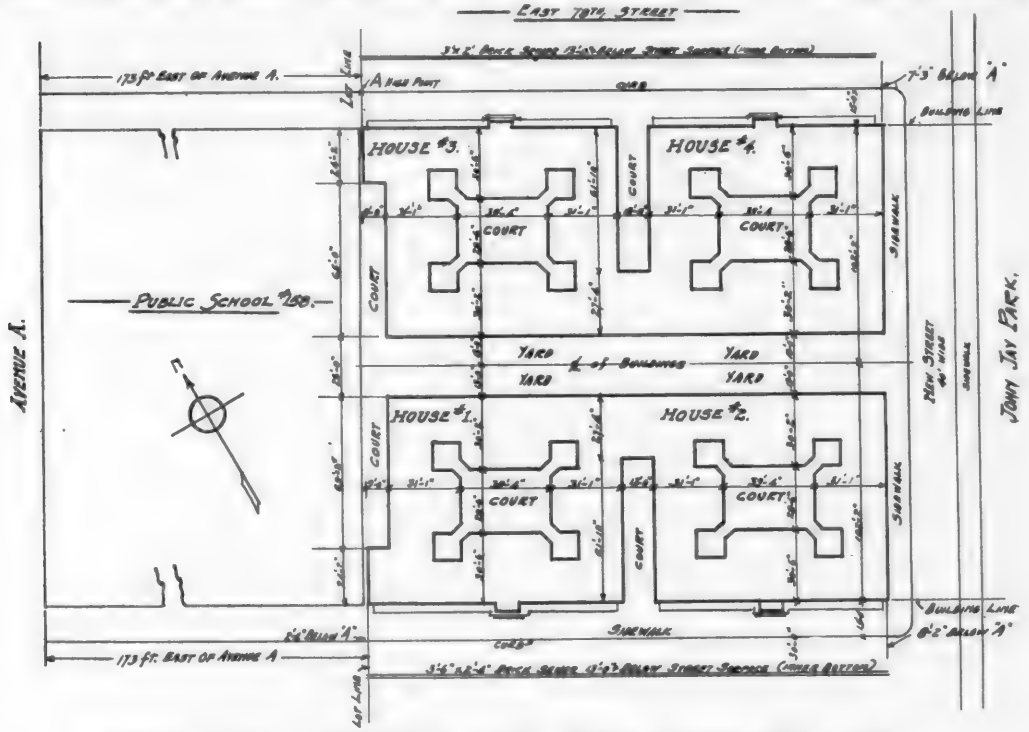
(d) With forced hot water circulation the piping can be materially reduced and run irrespective of grade and levels.

(e) No water hammer or air pocketed radiators has to be contended with.

(f) Absolutely positive circulation by means of a circulating pump.

(g) No excessive back pressure which represents a considerable amount of power wasted in the average combination power and heating plant.

On the other hand, it must not be overlooked that a steam system has the advantage over the hot water system, such as the above, in initial cost, and, although this worked out to be approximately



BLOCK PLAN, VANDERBILT EAST RIVER HOMES, NEW YORK.

in poor health and, therefore, the requisite heat to keep the apartments satisfactorily warm at all times is demanded.

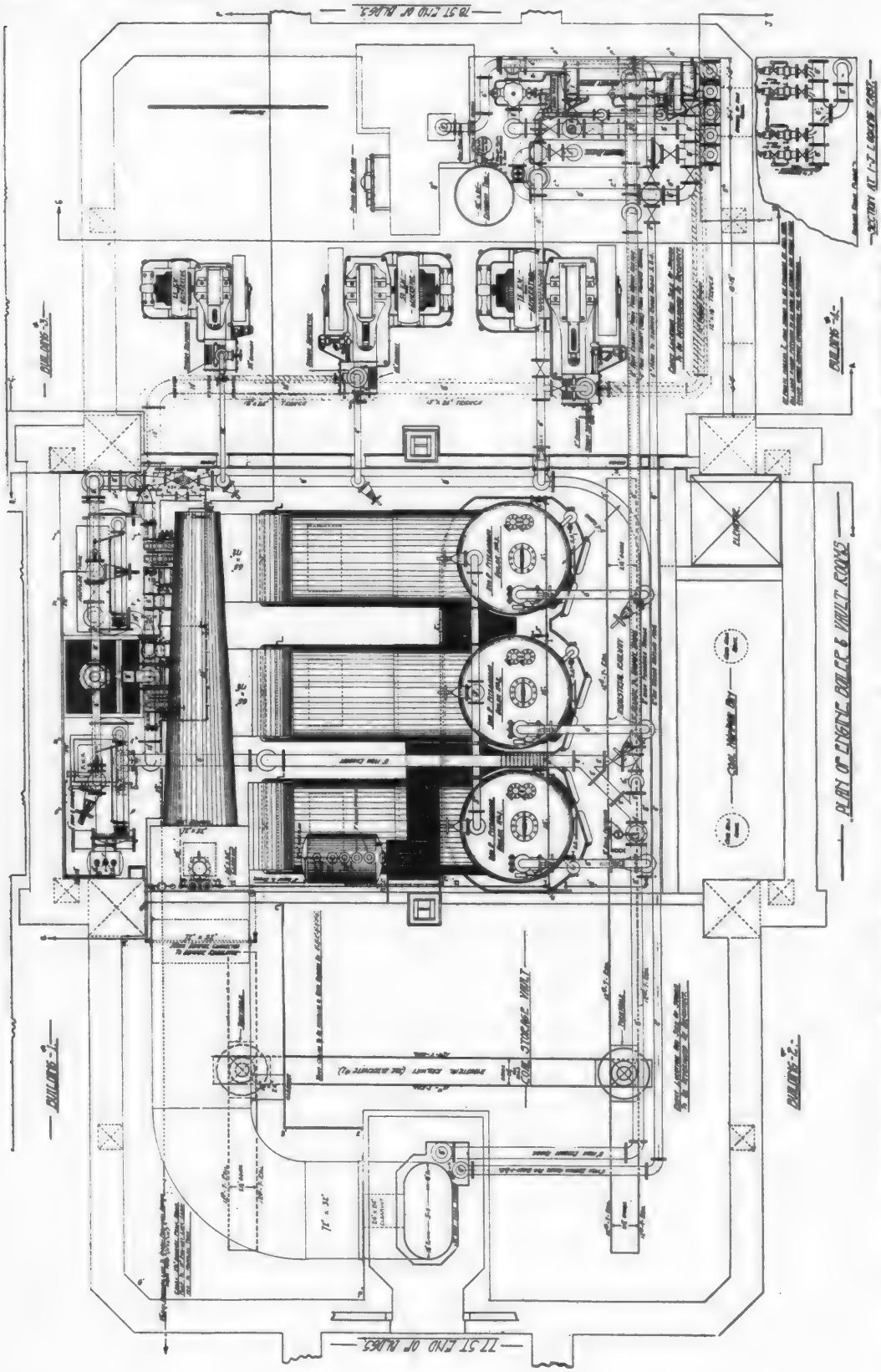
(b) Hot water has the decided advantage over steam by permitting better heat control at the individual radiators.

(c) With the overhead system of hot water heating, no air valves giving off their obnoxious odors, thereby vitiating the air in the rooms, have to be contended with, which air valves in the case of steam heating have to be located in the individual rooms.

18% more than the steam heating plant, it was found that the decided advantage in operation obtainable more than warranted the installation of a hot water system for this type of building.

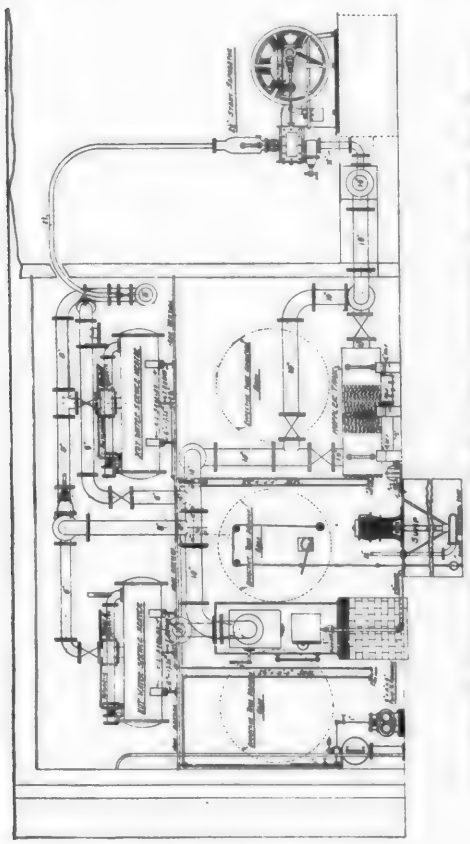
This increase in cost is largely due to the fact that approximately 25% more radiation is required, and would have been nearer 50% if the plant had been designed on a hot water gravity basis with individual plants in each building.

It might be interesting to know that, due to the extreme close clearances to which all of these rooms had to be de-



PLAN OF ENGINE, BOILER AND VAULT ROOMS, VANDERBILT EAST RIVER HOMES, NEW YORK.

signed, in order to meet the tenement house laws of the city, even the increased space of the radiators was considered important enough at one time almost to give up the idea of hot water heating, if it had not been for the very important factor of sanitation. These figures showed that by increasing the radiation 50% for a given room the increased radiation space went as high as 34% in some instances per radiator, depending on the design and style compared.



SECTION THROUGH ENGINE AND BOILER ROOMS AT E-F, LOOKING WEST.

The writer has purposely gone into detail with regard to the above, in order that it might be shown conclusively at the start why this type of system was adopted in preference to steam heating for the conditions imposed.

General Operation of Forced Hot Water Heating System.

From the exhaust ports of the 25, 50 and 75 K. W. engine generator units the exhaust steam is conveyed to the muffler tank, located in back of the boiler room, and from thence to a 200-H. P. Cochrane (open type with by-pass valve) feed water heater; from the feed water heater the steam is conveyed to the primary heater of the forced hot water circulating heating system. By reference to the general mechanical plant layout the reader can very readily follow the cycle of operation and secure the basic principles of the design.

This primary heater has been so designed as to conditions of available exhaust steam obtainable from the lighting plant and is so constructed that live steam can be supplemented during the night period under light electrical load conditions, should same become necessary, the heaters being so arranged that they can be operated independent of each other, or both operated in series.

These heaters, or, better still, steam condensers, are of the Alberger Pump & Condenser Company design, of the Wainwright type, with corrugated copper tubes, seamless drawn, made of pure copper, worked "dead soft," to permit of the maximum amount of expansion within the working limits of the tubes; the shells being made of cast steel will stand a pressure of 100 to 200 lbs., respectively.

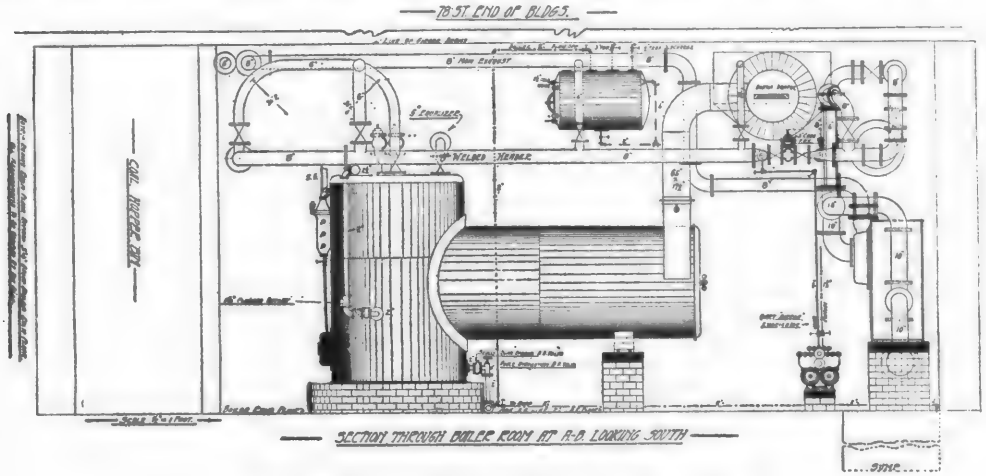
These heaters are so designed that the steam circulates on the outer shell of the tube and the water through the tube.

It might not be amiss to mention that the control of the exhaust steam from the lighting plant has been exceedingly gratifying, since during eight months of the year not a puff of steam has been found going to atmosphere. One can readily apprehend from this the advantages of good operation coupled with proper design, and the writer hopes at a future date to give a detailed description, with graphic charts, covering the operation of this plant. These charts are now being compiled.

The circulation pumps are of the De Laval type, with direct-connected De Laval steam turbines, units being furnished in duplicate, and their reciprocal piping being so arranged that either one can be operated at will. These pumps are capable of handling 1,500 gals. of hot water per minute at a differential hydrostatic head of 35 lbs., all the exhaust from these turbines being used. Each of

these pumps is provided with double suction.

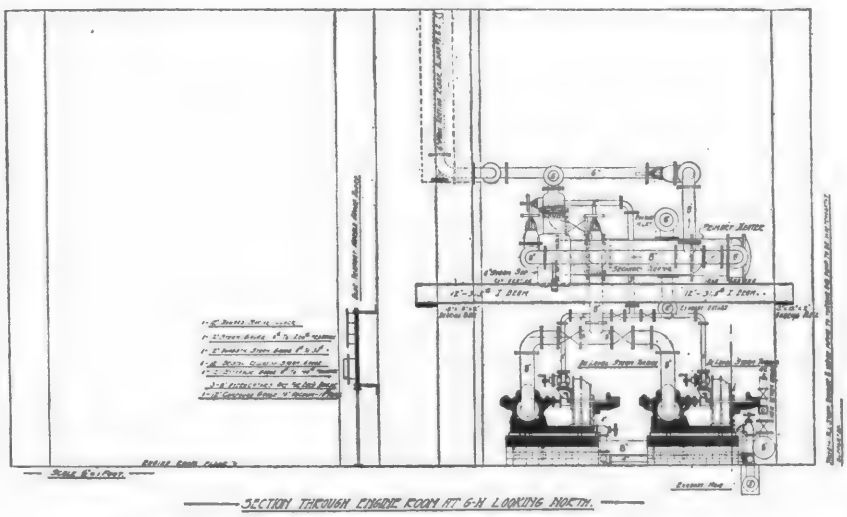
The water entering the disc chamber in this way forms a balanced suction, which does away entirely with the end thrust on the shaft, the source of much difficulty with single suction inlet pumps. These pumps are furthermore designed so as to permit of free access to the interior, being cast in halves. This construction permits of the removal of the disc without disturbing either the suction or discharge pipe joints.



SECTION THROUGH BOILER ROOM AT A-B.

From the primary and secondary heaters an 8 in. main is run, branching 6 in. to Buildings 1 and 2, and 6 in. to Buildings 3 and 4. The main controls of these four buildings merge into one common header as shown in section I J of plant layout, from which the engineer is able to determine, in joint comparison with the outside temperature and wind location and velocity, at what temperature the water is to be distributed to each of the four buildings.

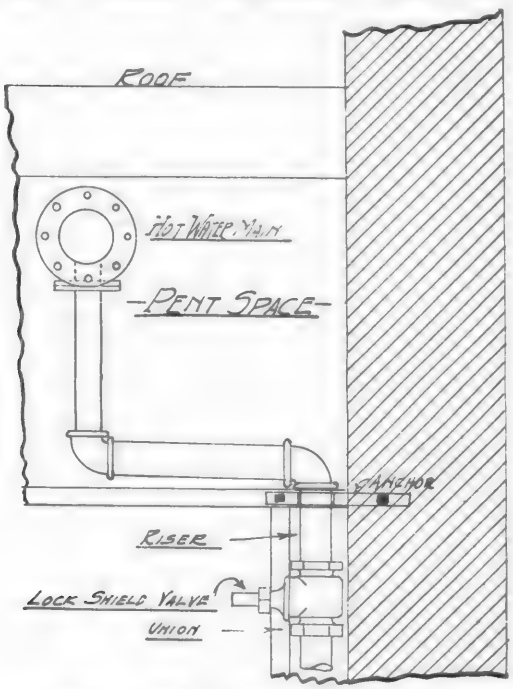
For taking care of the expansion of the water there is provided a 42 in. by 84 in. expansion tank, which is connected to the main return header, air compression being obtainable by means of an 8 in. by 8 in. Westinghouse air brake type compressor. This tank also is a medium for filling the entire system with water.



SECTION THROUGH ENGINE ROOM AT G-H.

Each of the two main 6 in. risers lead-

ing to the attic space in Buildings 1, 2, 3 and 4 connect to the circuit mains from which the individual one-pipe down-feed risers are taken with lock shield controlling valves below hanging ceiling space, thus permitting ready access to the valves without interference from ex-



TYPICAL HOT WATER SUPPLY RISER CONNECTION.

ternal sources. Two-pipe connections are taken from these individual risers to the radiators, with the control valve on the return side of the angle pattern design.

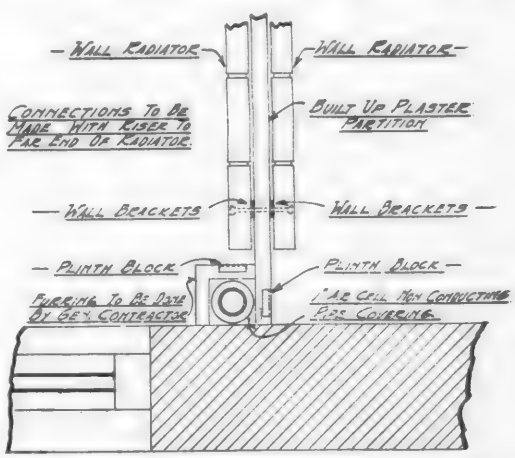
It might be interesting to know that each individual riser was tested independent of the other at a hydrostatic pressure test of 75 lbs, covering a duration of 24 hours, this being very essential, due to the fact that all risers are furred in, in order to obtain the highest sanitary condition permissible in the individual apartments. Special plinth blocks are provided for the connections from the risers to the radiators, to take care of the expansion of the branch lines from radiator.

All told, there is installed in all four buildings slightly over 40,000 sq. ft. of cast-iron radiation, distributed among 1,600 units, and for the most part of the single column, 32 in. high, Peerless plain design, of American Radiator Company manufacture, with ample access for cleaning in the rear of same. By referring to detail shown, the reader will notice how it was possible to minimize the number of risers, by serving two radiators in most of the typical instances, by placing them back to back, and supporting them from a common bracket of a special design.

Ventilation.

No ventilation was found necessary other than for eliminating the vapors and fatty gases from the kitchen ranges; in fact, none of the apartments is furnished with illuminating gas other than for cooking purposes, electric light being furnished as a part of the rent.

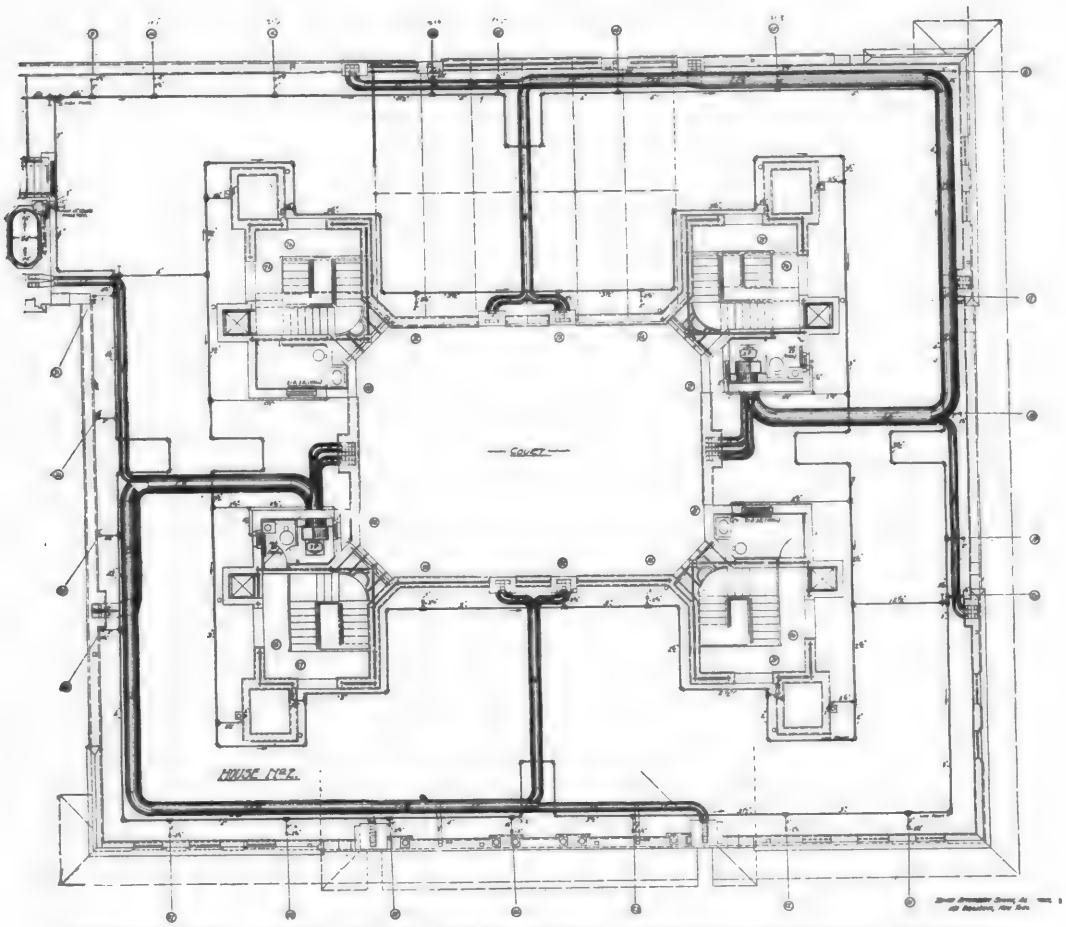
For taking care of these gases, vapors and products of combustion, there was installed over each kitchen range a collecting hood with a register outlet through the wall, from which terra cotta flues are run to the roof. Directly below the parapet wall, a by-pass connection is made to a collecting duct system, which terminates at the suction of


WALL RADIATOR
WALL RADIATOR
CONNECTIONS TO BE MADE WITH RISER TO FAR END OF RADIATOR.
BUILT UP PLASTER PARTITION
WALL BRACKETS
WALL BRACKETS
PLINTH BLOCK
PLINTH BLOCK
FURRING TO BE DONE BY GEN'L CONTRACTOR
1" AIR CELL NON CONDUCTING PIPE COVERING

PLAN OF TYPICAL RISER, SHOWING LOCATION OF PLINTHS, ETC.

the centrifugal steel plate blowers. These blowers are of the multiblade type, American Sirocco manufacture, capable of handling 5,000 cu. ft. of air per minute. The fans are direct connected to 3 H. P. shunt wound 230 volt D. C. motors of the Sprague Electric make.

Each fan serves one-half of one of the buildings, or two fans per building, there being eight fans in all. The con-



ONE-QUARTER ROOF PLAN, VANDERBILT EAST RIVER HOMES, SHOWING TYPICAL VENTILATING SYSTEM.

trolling dampers from these flues are regulated fro a the roof proper and are only closed to atmosphere during the regular cooking periods, other times operating on a gravity basis.

The main collecting ducts are run in the attic space, which space is similarly occupied for heating and plumbing piping purposes.

Domestic Hot Water Service Heating.

There are 64 bath tubs, 64 basins, 64 combination sink basins, or 192 fixtures per floor, for the four buildings, or 1,150 fixtures for six floors, and with the 32 wash tubs in basement, a total of 1,184 hot water fixtures in the entire building. From this it will be apparent that with this kind of tenancy, hot water is greatly in demand. For this service there were installed complete, two 10,000-gal. per hour hot water service heaters of the Alberger Pump & Condenser Company manufacture, capable of being operated in relay to one another, or simultaneously. These heaters are automatically controlled by thermostatic regulation, the outgoing temperature of water being maintained at 180° F.

Power Plant.

For the generation of steam there were installed three 200 H. P. high pressure Fitzgibbons boilers, and for compactness and accessibility for the space allotment given, met this very exacting condition extremely well. These three boilers are cross-connected and equalized with respect to one another, so that either two can be operated at will.

Each of these boilers contains 2,000 sq. ft. of heating surface and is provided with a Lagonda automatic non-return valve, two safety relief valves, one set

a few pounds above the other, Williams high and low water column and other necessary appurtenances.

It might be of interest to note that the boilers have been set at an angle of 35° off center, exacted by the extreme limited firing space to which these boilers were subjected. An 8 in. welded header of the M. W. Kellogg manufacture in front of boilers, made of one piece of pipe, with long radius leads, connects the boilers to the engine throttle. Vertical Stratton steam separators were employed on each of the leads to throttles, as well as one horizontal separator for the use of the live steam heater and the turbines.

For taking care of the high pressure drips from the header, engine throttles, separators, etc., there was installed the Holly high pressure gravity return system. Each of the several sections, such as header engine and turbine throttles is subdivided and carried back to the receiver located in sump pit, from which the condensation is discharged to the discharge chamber, located in stack, from whence it is carried back, by gravity, to boilers.

The boiler feed pumps are in duplicate, of the Buffalo Steam Pump Company manufacture, size 6-in. by 3½-in by 6-in. of the pot valve outside end packed plunger type, the water being taken from the feed water heater, and discharged through a Blackburne Smith feed water filter before entering the boiler.

For taking care of the condensation from the hot water service heaters as well as the discharge from the traps of the driers used in connection with the clothes drier system, a pump and receiver has been furnished, permitting of the equalization of the pressures from these several sources, which is likewise arranged to be fed into the boilers. This arrangement also incidentally takes care of any surging effects due to excessive demand of hot water, so that no condensation is permitted to be wasted to the sewer. From the returns of the two large hot water service heaters, through proper seal, there are provided two independent condensation meters, permitting of the proper distribution charges to be made for the several services to the buildings, which will be treated later in connection with the article on operating costs of this plant.

Clothes Dryers.

For all four buildings, and located in basement, there are provided twelve clothes-drying rack outfits of the Chicago Drier Manufacturing Company make, each clothes drier containing eight racks. These driers are provided with 200 sq. ft. of pipe coil surface. The building is managed in such a way that the drying of the clothes of this vast multitude is arranged in accordance with floors and days; in other words, there being six floors or an assignment of one day per floor. The roofs are used as recreation centers, with roof gardens, etc.

Illumination.

For furnishing electricity for the illumination of the apartments there is installed a three-wire electrical transmission system, 230-115 volt D. C., with two wire distribution from floor panels, to the various rooms, and such other motor services required for fans, elevators, etc. Each room is provided with an independent fixture and the cost of the electrical service is practically nil, in view of the fact that all the exhaust available from this source is used for domestic heating, and in connection with the condensers for the forced system of hot water circulation, the steam being diverted to these several systems according to the seasons of the year. From this it is evident that the cost of electricity is only the maintenance and repair, which relatively is very little.

Refuse.

The problem of garbage disposal is handled in rather an unique way. Recessed into the wall of each kitchen there is provided a cast-iron box which is provided with a garbage can. The cans are so made that when the door is shut a cover, by means of a series of levers from the door proper clamps down on top of the can, thereby keeping at all times this refuse matter virtually hermetically sealed. The refuse thus collected is periodically removed, every morning and evening, by means of dumb-

waiters running to each apartment. This will give an idea to what degree the problem of sanitation was considered.

Coal Storage.

For coal storage there is provided a vault large enough to supply, under normal conditions of operation, one month's demand. For handling this coal from the bunker to the vault there is installed a Hunt industrial railway system, with the requisite turn tables, etc., track being laid on 21½-in. gauge, consisting of 12 lb. T rails. One-ton end tilt apron industrial car from which it is possible to feed the boilers direct without re-loading is provided. In connection with this there is provided a one-ton industrial track scale, with sliding main poise levers, so that it is possible to weigh every ton of coal actually used. There is also provided in the main court, between the two curbs of buildings, a 10-ton Fairbanks platform scale, so that all coal received from the coal yard is weighed before delivered into the bunkers.

The buildings were designed and erected from the plans of H. Atterbury Smith and William P. Miller, associated architects. The power plant, heating and ventilation equipments were designed by Griggs & Holbrook, and the electric lighting by Clark McMullen & Riley. The contractors for the mechanical equipments were Evans, Almirall & Co.

Conclusion.

In order that the results of the original recommendations and cost data as to operation might be had for the benefit of the readers, the same is now being compiled for a future article, with the generous assistance of the chief engineer, Robert Koethen, to whose executive ability a great measure of the success of this plant is due.

Temperature and Ventilation as Efficiency Factors in Mills

By C.-E. A. WINSLOW.

The growth of efficiency systems in industrial work has called increased attention to the importance of fresh air as one of the first factors to be considered in this connection. How important this is was brought out by Prof. C.-E. A. Winslow of the College of the City of New York in an address on the subject of "Temperature and Humidity in Factories," delivered at the recent National Conference on Industrial Diseases at Atlantic City. The principal portions of Prof. Winslow's address are given herewith:

It is quite clear that the principal thing which makes the air of confined spaces harmful, aside from the special problems presented by dust and fumes, is overheating, especially when combined with excessive moisture. This has been established by the exhaustive studies of physiologists in Germany, in England, and in the United States; while the same studies have as yet failed to reveal any definite bad effects due to the chemical constituents of the air. Other atmospheric conditions are still in doubt. The best lower limit of temperature is uncertain. The action of hot, dry air is debatable. The physiological effect of odors in air has not been demonstrated. It is beyond question, however, that the workers in a factory where the temperature is over 70° are injured by a lowering of their vitality that may lead to tuberculosis and other serious diseases; and that they are working below their normal standard of efficiency, so that both they and their employer are the losers.

The New York State Department of Labor is the only official body in this country, so far as I am aware, which regularly carries out examinations of factory air and publishes the results. From the reports of this department for 1908, 1909, and 1910, it appears that 215 workrooms were examined at seasons when the outdoor temperature was 70° or less. Of these workrooms 156, or 73%, had

temperatures of 73° or over, and sixty-three, or 29%, had temperatures of 80° or more.

In a recent study of a mill village carried out by the Rhode Island Anti-Tuberculosis Society, temperature and humidity readings were taken three times a day inside and outside of a weaving room. The outdoor temperature for the month (September) averaged 65.5°. The temperature in the weaving room averaged 75.8°, 10° higher. Is it not clear that, aside from all debatable questions, there is a simple and obvious condition here which directly menaces the health of the workers and impairs the efficiency of industry?

OVERHEATING SHOULD BE PREVENTED

The first clear problem of air conditioning in the factory is the prevention of overheating. The practical method of attaining this end is air change or ventilation. With only a few people in a room, heat may be transferred through cracks and through the substance of walls and ceiling with sufficient rapidity, without any special provision for the purpose. Where many workers are crowded together, however, this is impossible. The most convenient method of removing excess heat is by air change; and the primary need in factory ventilation is to provide for the removal of the heated air and its replacement by cooler air from without. The latter must usually be first tempered by raising it to a point a little below that which is normally felt to be comfortable. Whatever may be the case in hospitals and schools, it is fairly certain that incoming air much below 60° would not be endured by factory operatives; and it would certainly not be compatable with efficiency in the majority of trades which call for manual dexterity.

STIMULATING EFFECTS OF CHANGES IN TEMPERATURE

It is maintained by many sanitarians that changes in temperature are stimulating and beneficial. There is little exact evidence for this view, but it is in harmony with general experience and is probably correct. In many schools it is the practice to open windows and flush out the room with cold air every two hours or so, and the effect upon the spirit and efficiency of the pupils is said to be excellent. Such a procedure might be well worth the temporary interruption of work in many industrial processes. It is merely a modification of a general system of air conditioning, however, not a separate system by itself. The fundamental problem is the exhaustion of the hot air of the workroom and the supply of cool but tempered air to take its place.

In general, I believe the hot air should be taken out near the top of the room and the cool air admitted near the bottom. The hot air may escape by its own tendency to rise or may be sucked out by fans. The cool air may be admitted at window openings in the room, equipped with tempering coils; or it may be forced from a central point through special ducts. The system of ventilation may or may not be supplemented by a direct system of heating. The essential principle remains unchanged.

ONLY TWO TYPES OF FACTORY VENTILATION LAWS

At present there are only two types of laws on the statute books of American states, with the exception of the 1909 law of Illinois. Eight or ten states provide for a minimum cubic space per occupant, usually 250 or 400 cu. ft. Some twenty states require that factories shall be "ventilated" or "well ventilated" or "sufficiently ventilated." The cubic space requirement by no means insures good air conditions. It merely prohibits such a state of overcrowding that proper air conditions are impossible. Whether a factory with ample air space is comfortable or not depends on the further provision for air change.

AIR SPACE PER OCCUPANT NOT ESSENTIAL

In the studies made by the English departmental committees it was found that the air was no better on the average in factories with over 5,000 cu. ft. of air space per occupant than in those with an air space under 300 cu. ft. As to the provisions that factories must be "ventilated" or "well ventilated," they are unenforceable and meaningless in the hands of the present departments charged with factory inspection in this country. The Illinois law is the only real ventilation law in the United States. It provides that a definite amount of air, 1,500 to 1,800 cu. ft. per occupant, according to specified condi-

tions, shall be supplied, unless the cubic space in the workroom be over 2,000 cu. ft. per occupant and the outside window and door space be equal to one-eighth of the floor space.

QUALITY VS. QUANTITY OF AIR SUPPLIED

In formulating a standard for factory ventilation one is met at the outset by the question whether the standard should be a mechanical or an analytical one. Ventilating engineers prefer to have the amount of air supply fixed as in the Illinois law. Sanitarians argue that the proper standard is the actual condition maintained in the workroom, however it may be reached.

In a proposed law drafted in conference with members of this association in New York a year ago and introduced in the state legislature as Senate Bill No. 1019, on March 31, 1911, an attempt was made to combine these two viewpoints on an alternative basis. This bill provided that "a workroom shall be deemed to be properly and sufficiently ventilated if the air in the working parts thereof does not contain more than nine parts of carbon dioxide in 10,000 volumes of air in excess of the number of parts of carbon dioxide in 10,000 volumes of the exterior air, or if there is constantly supplied throughout the interior of the room at least 1,200 cu. ft. of air per hour for each person therein present and employed and in addition thereto at least 1,000 cu. ft. of air per hour for each cubic foot of gas burned per hour." Such a law, which demands a reasonable rate of air change, to be demonstrated either by analysis or on a mechanical basis, seems eminently fair to the manufacturer and probably safeguards sufficiently the health of the worker so far as the extent of air change is concerned.

Any ventilation standard must, however, deal with the quality as well as with the quantity of the air.

The most important things are the temperature and humidity of the air. These qualities are measured very simply by the use of an instrument known as the sling-psychrometer, which consists of a pair of thermometers, one of the ordinary type and the other having its bulb covered by a wet cloth. Moisture evaporates from the wet cloth at a rate determined by the amount of moisture in the air and this evaporation cools the wet-bulb thermometer and lowers the temperature recorded. From the temperature of the dry-bulb thermometer and the difference between the dry and wet bulb, the moisture in the air may be readily calculated. A high wet-bulb reading means a combination of temperature and humidity, precisely the condition most harmful to the human organism, and Haldane has shown that in general a given wet-bulb reading has about the same physiological effect, whether it be the result of a very high temperature with low humidity or of a moderately high temperature combined with high humidity.

The proposed New York law, to which reference has been made, provided that "the temperature in any factory workroom except a boiler room, shall not exceed 72° F. as determined by the wet-bulb thermometer, unless the temperature of the exterior air exceeds 70° F. as determined by the same process, in which case the wet-bulb temperature shall not exceed that of the exterior air by more than 5°." A wet-bulb temperature of 72° would correspond to a dry-bulb temperature ranging from 72° with completely saturated air to 93° with air containing only 30% relative humidity.

It is just here that the difficulty comes in formulating a standard for factory ventilation. Either the Illinois law or the proposed New York law would serve pretty well to regulate the amount of air to be supplied. I do not believe, however, that we have adequate data for fixing a maximum figure for temperature and humidity. The limit of 72° wet-bulb written into the proposed New York law was taken as a maximum which would probably not be onerous to the manufacturer, but it is possible that even this limit might be difficult of attainment in certain industries, while in most factories is is probable that a much more stringent regulation could well be adopted. Industrial processes are very diverse and any rigid statutory standard is likely to work hardship on the one hand and to give inadequate protection to the worker on the other. Standards for factories can only be wisely formulated after a careful study of existing conditions in the light of physiological ideals and by striking a fair balance be-

tween what we should like and what the factory owner can reasonably provide. In our own homes we maintain, not a wet-bulb maximum of 72°, but a dry-bulb maximum of 70°, a different thing.

RULES FOR COTTON WEAVING SHEDS

The old English law governing conditions in cotton-weaving sheds provided that in sheds in which there was artificial humidification the limit for carbon dioxide should be nine parts per 10,000, and fixed a definite relation between wet and dry-bulb temperatures for each dry-bulb temperature over a wide range, but set practically no upper limit for either. With the advance of modern ideas as to the supreme importance of temperature in air conditioning the whole question was reopened by the creation of a departmental committee which heard ninety-six witnesses, including physiologists, factory inspectors, mill owners and operatives, made seventy-six inspections and numerous air examinations, published the results in 250 closely printed pages and formulated a new standard raising the carbon dioxide limit to eight parts in excess of that in the outside air and adding a temperature limit of 75° wet-bulb. All this was done for one branch of one industry; precisely this sort of investigation is urgently needed in the United States.

THE WISCONSIN PLAN

In view of the difficulty of formulating legal standards, Wisconsin has adopted an entirely different plan, abandoning entirely the attempt to fix the details of factory regulation in the form of law and creating instead an industrial commission with power to fix specific standards whose reasonableness can be reviewed only by the supreme court of the state. The regulations of such a commission could be made far more responsive to the varied and changing conditions of science and industry, and would offer the most promising method of securing a maximum of protection for the worker with a minimum burden on the business itself.

AIR CONDITIONING MORE IMPORTANT THAN ELIMINATION OF SPECIFIC POISONINGS

General sanitary conditions, and particularly air conditioning, are far more important in the aggregate than specific poisonings. The latter are obvious and spectacular, but they only affect a comparatively small fraction of the working class. Even in the pottery industry, one of the trades most subject to lead poisoning, it was shown in England by the departmental committee on this industry that the excess death rate due to plumbism was only 0.8 per 1,000 while the excess death rate due to tuberculosis was 7.0. Industrial tuberculosis pervades not only the dusty trades, but in less degree every industry from the largest to the smallest. Yet as to air conditioning in our factories we know pitiably nothing and we have no machinery for finding out anything. New York has a good medical and laboratory expert in Dr. Graham-Rogers. Illinois has recently appointed a medical expert. Massachusetts has a force of fifteen medical inspectors devoting some or all of their time to the work. This is all that we have in the way of scientific factory inspection in the whole United States.

For progress in air conditioning it is essential to have air examinations and intelligent inspection of ventilating appliances in factories of various types. Only on the basis of such studies can legal standards be enacted or specific rules laid down by a factory commission. Yet we have in the whole United States, except for Dr. Graham-Rogers in New York, not one single chemist or engineer regularly employed by any state to study factory air conditioning.

PRACTICAL METHODS OF STUDYING AIR CONDITIONS

Meanwhile, however, there is an excellent opportunity for the individual factory owner to benefit his employees and increase their output by attention to the problem of air conditioning as regards temperature and humidity. There should be a thermometer in every workroom and the foreman should be made to understand that every time the temperature passes 70° he is failing to secure the best work from his hands. In any large factory, observations of ordinary temperatures should be supplemented by the use of the sling-psychrometer. Only by such observations can window ventilation in small shops and ventilation systems in large factories be intelligently controlled.

Direct practical results in diminishing absences and decreasing damaged and imperfect work have been obtained in many a factory by improved air conditioning. Efficiency methods have been applied to a hundred mechanical details of shop administration. That delicate mechanism, the human body, is, however, the underlying factor which is after all of most importance. Yet in many a workshop, perhaps in most workshops, the human body is being operated under conditions which preclude its maximum effectiveness, and the work suffers while the sanitariums fill up with cases of industrial tuberculosis.

A Method of Automatic Humidity Control for Air Washers

By J. I. Lyle.

A system of humidity regulation depending in principle upon the control of the dew point or saturation temperature leaving the air washer was described by J. I. Lyle before the Heating Engineers' Society at its recent meeting in Detroit, in the course of an exhaustive discussion of this subject. In the system referred to, saturation is produced by heating the spray water. This water supplies the latent heat of evaporation, and, in addition, raises the temperature of the incoming air to the desired dew point; that is, to the temperature necessary to hold the required amount of moisture. The water temperature is varied as is necessary to maintain a constant dew point under variable conditions of the entering air.

The variation in the amount of work to be done is quite large. To illustrate: Supposing the requirement to be 60% relative humidity at 70° F., which is the equivalent of 4.8 grains per cubic foot, or a dew point of 55°. Then on a zero day, with ¼ grs. of water vapor per cubic foot in the entering air, the work per 1,000 cu. ft. of air is

$1{,}000 \times 55 \div 56 = 982$ B.T.U. sensible heat to raise the air from zero to 55°.

$1{,}000 \times (4.8 - 0.25) \times 1{,}080 \div 7{,}000 = 700$ B.T.U. heat of evaporation.

Total heat required = 789 B.T.U.

In a washer using 3 gals. of water per 1000 cu. ft. of air the necessary drop in the water temperature is $1{,}682 \div (3 \times 8.33 \times 1) = 67\frac{1}{2}°$. This is about the maximum requirement. Again, on a humid day of autumn or spring no heating of the water is required, since no additional moisture is needed. If a tempering coil is used in front of the washer, of course the washer is relieved of a part of the work necessary in suppiying the sensible heat. In the first case of the example just referred to, with the tempering coil heating the air, say to 50°, the amount of heat to be supplied by the water is

$1{,}000 \times 5 \div 56 = 89$ B.T.U. sensible heat.

$1{,}000 \times (4.8 - 0.25) \times 1{,}080 \div 7{,}000 = 700$ B.T.U. latent heat.

Total heat required = 789 B.T.U.

With the washer using 3 gals. of water per 1,000 cu. ft. of air, $789 \div (3 \times 8.33 \times 1) = 31°$ drop in water temperature is required to supply the heat. The conditions of the incoming air are changing constantly and continuously, so that the automatic control system must be extremely flexible to meet the great range of work required, if satisfactory results are to be procured.

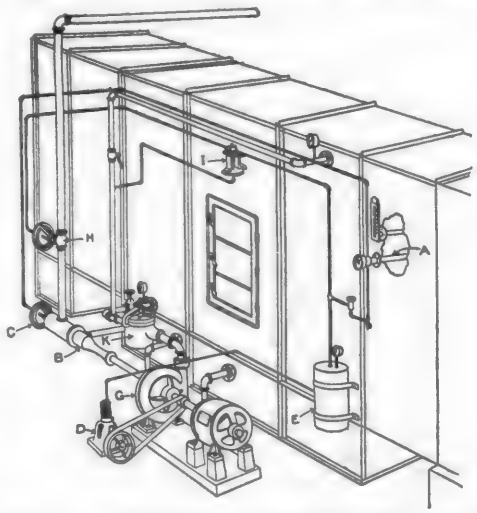


FIG. 1.—GENERAL ARRANGEMENT OF SYSTEM FOR AUTOMATIC HUMIDITY CONTROL.

The general arrangement of the humidity control system is indicated in Fig. 1.

The stem of a graduated thermostat shown at A is placed in the air passage just beyond the eliminators, so that it is exposed to the temperature of the air

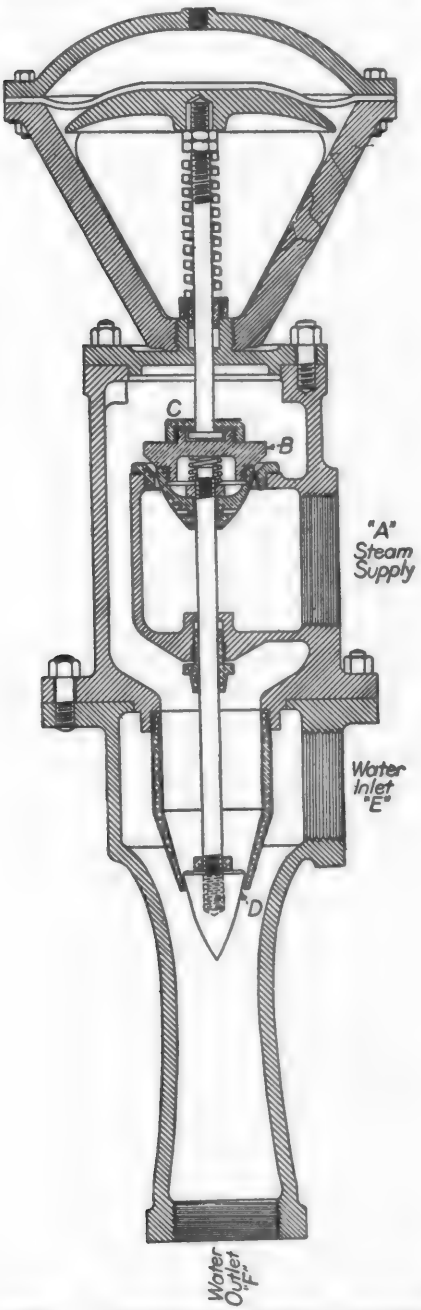


FIG. 2.—EJECTOR WATER HEATER.

leaving the washer, and its expansion or contraction is caused entirely by this temperature, and the variation due to its expansion is made to regulate this temperature.

The water heater of the ejector type shown at B is placed in the suction line to the pump. The heater operates like a barometric condenser, so that the temperature of the spray water is varied by varying the amount of steam furnished to the ejector.

The diaphragm steam valve shown at C is placed in the steam line which supplies the water heater. This valve is operated by compressed air pressure from the graduated thermostat A.

The air compressor shown at D furnishes compressed air at about 15 lbs. pressure to the storage tank E. The compressor is driven by the same motor that drives the spray water circulating pump G.

The reverse acting diaphragm valve shown at H is normally closed, but is opened by compressed air from the tank, E, passing through the safety valve, I.

The pot strainer shown at K is for the purpose of catching any scale or dirt which may be brought from the steam lines.

HOW THE SYSTEM WORKS

This method is extremely sensitive as any variation in the air temperature passing over the stem of the graduated thermostat produces a change in the air pressure of the diaphragm steam valve, causing the valve to partially open or close, thereby producing a new water temperature. In only a few seconds this water is sprayed into the air, affecting its temperature, giving to it more or less heat in accordance with the requirements of the thermostat. This air in about one second passes over the thermostat stem, imparting to it the change in temperature, thereby completing the cycle. The system, while sensitive, is not frail or delicate.

The common difficulty usually experienced in the heating of water by an automatically controlled ejector is the noise produced when very little steam is being used. This noise is a water hammer occurring when a reduced amount of steam at low velocity enters a large volume of water and suddenly condenses. This causes a partial vacuum which the water immediately fills, producing an impact which forces the valve against its seat.

The design of the heater shown in Fig. 2 prevents the hammering of the valve.

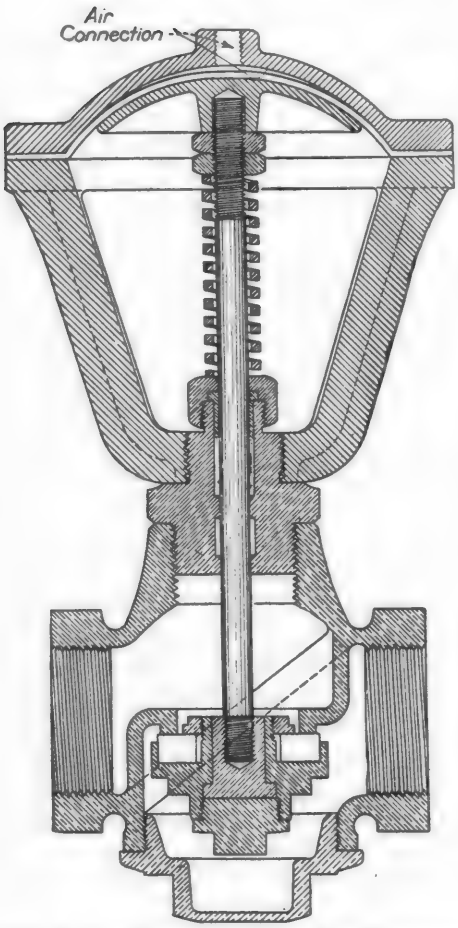


FIG. 3.—REVERSE ACTING DIAPHRAGM STEAM VALVE.

The diaphragm steam valve is made a part of the heater. This device will operate with steam at 3 lbs. or over.

Fig. 3 is a section through the reverse acting diaphragm steam valve. This valve is held closed by the spring when the air pressure is relieved or when it is low.

Fig. 4 shows the Carrier combination safety valve. It consists of two small air valves operated by a diaphragm and coil spring. Compressed air direct from the tank enters at the connection A and outlet B connects with the diaphragm of the reverse acting steam valve. Water pressure from the centrifugal pump is connected to the under side of the metal diaphragm at C.

Should the water pump be shut down or should it for any reason lose its suction, the water pressure is released from under the diaphragm. The spring forces the diaphragm and stem downward, shutting off air pressure by closing the valve D and opening valve E, releasing to the atmosphere the air pressure in the line running to the reverse acting diaphragm steam valve. The combination of these two valves makes it necessary for the proper air and water pressures to be supplied to the apparatus before any steam can be used in the water heater. This arrangement makes it impossible for steam ever to enter the air currents and over-humidify the building on account of failure of air or water pressure.

Where steam is not available at a pressure of 3 lbs. or over; that is, where a vacuum steam heating system or hot water heating is installed, a closed water heater is used. The water passes through the tubes with the heating medium on the outside. This heater takes up more space and costs more, but is just as

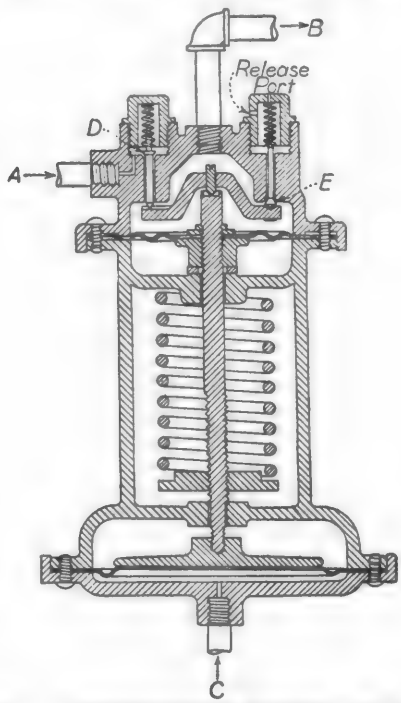


FIG. 4.—COMBINATION SAFETY VALVE.

efficient as the ejector type of heater which it displaces.

With this method of humidity control it is not necessary to regulate automatically the tempering coils, as no harm is done if the temperature entering the washer falls below freezing. The coils are used in very cold weather to heat the air to any temperature, say between 25°

and 45°, and thus relieve the spray water of some of the work.

If automatic control is for any reason desired for the tempering coil or coils, the thermostat should be placed in the fresh air, so it will be exposed to the temperature of the incoming air rather than to the temperature of the heated air. To illustrate: Suppose one coil is thermostatically regulated and this coil has sufficient surface to increase the air temperature, say 15°, and the thermostat is set for 25°. When the outside temperature falls to 25° this coil will be turned on full and the air heated to 40°. When the outside temperature rises above 25° this coil is shut off and the air will go to the washer at temperatures varying between 25° and 40°, which is sufficiently close for the humidity control, by this method.

The advantage of exposing the thermostat to the outside temperature rather than to the air leaving the tempering coil is that when the outside temperature falls below 25° steam is turned on to the coil and is left on until the outside temperature rises above 25°.

If, however, the thermostat was placed after the coil, whenever the temperature fell below that for which the thermostat was set the steam would be turned on the coil. As soon as the temperature rises a few degrees it would be again turned off. This continual turning on and off of the steam valve gives but little time to establish proper steam circulation, with the result that it is very probable only part of the coil will be heated; so troubles from stratification of cold and hot air will be experienced.

PRACTICAL DIFFICULTIES IN THE REGULATION OF A TEMPERING COIL

(After showing various methods by which humidity may be regulated theoretically by regulating the temperature of the air entering the air washer, the author showed how the actual regulation of this temperature in practice is a most difficult problem, although it has been repeatedly tried.)

BYPASS DAMPERS—The first method which would naturally suggest itself is to use a bypass damper over or under the tempering coils. This cannot be used on account of stratification. The air entering through the tempering coil and through the bypass damper would have different temperatures, and while in going through the washer these temperatures would be changed, they still would be different, and that difference probably as great as on entering the washer.

Air passing through an 8 in. vertical space between two tempering coils has been known to freeze a solid cake of ice 4 in. wide upon the eliminator plates of the washer 6 ft. away. The air passing through the tempering coils was heated to 40° and the spray water was also heated, so the balance of the air was leaving the washer at 45°. The thermostat controlling the temperature of the air was in the path of the air which had passed through the tempering coil.

Unless the fan is placed between the tempering coils and washer so it will be mixed and all stratification removed, the regulation of the temperature entering the washer by means of a bypass around the tempering coils is not practical. In fact, it might be said to be impossible.

To place the washer on the pressure or discharge side of the fan is very objectionable, as any leakage of air from the washer carries water from the spray out with it. If the washer is on the suction side, however, any air leakage is inward and the doors of the washer may be opened for inspection while it is in operation, without any water coming out on the observer.

REGULATING STEAM SUPPLY TO TEMPERING COIL.—The automatic operation of a steam supply valve to a tempering coil must be positive and complete to be practical. The valve must be opened sufficiently wide to entirely fill the coil or it must completely be closed off. Any intermediate or graduated action which does not allow of completely filling the coil with steam is sure to cause trouble in cold weather. A part of the coil would be filled with steam and be hot, while the rest of the coils would be cold. The condensed steam is often held in the coil, due to the high vacuum thus produced, and is frozen in the cold part of the coil by the very cold air passing over it. Valves that were partially open have been known to furnish sufficient steam to one end of a tempering coil to heat the air well above freezing, while the condensation froze and cracked the base at the cold end.

From this it is very evident that any method of humidity control with an air washer must operate the steam valve positive from full open to closed position, or vice versa. In all the methods mentioned which depend upon the operation of a tempering coil and which will even theoretically give automatic regulation of humidity, the incoming air must be heated to at least 90° on a zero day, with ¼ grain of vapor per cubic foot of incoming air. This requires "some tempering coil," with its attendant resistance to the air passage.

Now the question comes, How is it to be automatically regulated? Consider the best way to do it first, and see how bad that way is, and probably a further discussion will be unnecessary. This tempering coil must of necessity (in order to accomplish the desired result, that of automatically controlling reasonably close the relative humidity) have the steam supply so regulated that the temperature of the air entering the washer will be maintained within a range of say 2° to 3° of that required by the regulator. One section of the usual types of tempering coils with an air velocity of 1,000 ft. per minute and steam at atmospheric pressure will heat the air at the very least 15°. Let us consider, therefore, that the regulator is operating the steam supply to only one section of the tempering coil, and that the other sections (at least five others being required) could be and are carefully watched and regulated by hand.

The air would enter the automatically controlled section of the tempering coil at 62½° and be heated to 76°. In passing through the washer moisture is evaporated and the air cooled to 67°, with 4.9 grains of vapor per cubic foot, giving 62% humidity at 70°. However, the regulator is set for 60% humidity at 70°, which is equal to 4.8 grains per cubic foot. The regulator would, of course, tend to lower the temperature given by the tempering coil in order to reduce the humidity, and when it acts it must close off this section, allowing the air temperature to drop to 62½°, which will be cooled in passing through the washer to 57°, with only 4.2 grains of vapor per cubic foot, which is equal to 52% at 70°.

Some will say, "controlling the humidity within 10% is plenty close enough for me," and in a great many cases they are right, but the worst is yet to come.

In the above discussion we were considering the air was leaving the tempering coils, which were hand controlled, at 76° temperature and 3½ grains of vapor per cubic foot and was heated in the last section to 62½°. Now, suppose during the day the vapor content of the outside air falls from 3 grains to 1½ grains per cubic foot, without any change in temperature, so the air will still leave the coils, which are being regulated by hand, at 62½°. This would give a relative humidity of 32%. The engineer should now turn on an additional coil and heat his air higher. If he did, then the control would alternate between having the air enter the washer at 76°, giving 42% humidity at 70°, but how is he to know this, even if he had the time to watch it closely? The instrument that will do it automatically has not yet been invented, and, even if it had been, it would be a very awkward way to accomplish the result.

If the regulator controls two sections poorer regulation would be procured. Any arrangement of this kind is not sufficiently flexible to meet even very slight changes in the fresh air conditions, nor at its best does it give an approximate accurate regulation. Hence, the automatic regulation of humidity within reasonable limits by varying the temperature entering an air washer by operation of the steam supply to the tempering coil is practically impossible.

DISCUSSION

H. L. WILLIAMS: I had an experience with air washers last winter that made me reflect considerably regarding them. I ran across a specification reading like this: "That at or below a temperature of 55° F. on the outside, the relative humidity shall remain between 50% and 60%." There was no leeway whatever. This was a case of a bank building. I am citing it because I think sometimes engineers are drawing on their imaginations regarding the operation of the apparatus.

I am glad to see that the author suggests placing the thermometer in the cold air inlet instead of after the tempering coils. The specification I have just de-

scribed provided that we should have 55° between the tempering coil and the air washer, or they could not do the work. I suppose that under ordinary circumstances, we could have come reasonably close to doing what the specifications provided; and I also think that in cold weather we were accomplishing our results, but when it came to a temperature anywhere between 35° and 55°, we struck an entirely different proposition. Here was a building which, if it could have been kept closed, might have been successfully heated and humidified with this apparatus. But the door at the main entrance was opening on an average of once every minute, and with the outside air near the saturation point, it was impossible to keep the indoor air between 50% and 60% relative humidity.

L. C. SOULE: I would like to have the author tell us something about the reheating coils and the use of by-pass dampers underneath.

MR. LYLE: In the control of reheating coils, you do not run across the same difficulties that you do in controlling the tempering coils, due to the fact that the air is always above the freezing point. The question of controlling reheating coils is simply a question of mixing the air and getting the proper temperature in the rooms. If it is controlled by by-pass dampers placed in front of the air washers, it is absolutely impossible, due to stratification. In some tests I mave made on running installations, where the by-pass dampers have been insisted upon by the engineer, differences of temperature of as much as 20° have been found between the top and bottom of the air washer, due to the high temperature of the air going through the tempering coils and the low temperature of the air going through the by-pass. I have seen the eliminator freeze up so that no air could pass through the bottom of it.

Now the thermostat or hygrostat is not spread over the entire surface of the outlet of the air washer, but is located only at one point, either in the path of the heated or cold air, and, for that reason, you must have the air entering the washer uniform in temperature over the entire surface. If you do not, your leaving condition will vary and your controlling device will not be subjected to the proper conditions.

MR. ELLIS: I would like to know whether the desired result is not accomplished if the sections of the tempering coil are turned on one after the other.

MR. LYLE: As far as the control of the temperature is concerned, using a relay and turning on one section after another of the tempering coil will give you temperature control within, say, 10° or 15° at the most. But when it comes to controlling the humidity that way, it is rather hopeless, because your humidity does not depend upon the entering temperature alone, but on the combination of the entering temperature and entering humidity. You might be holding the temperature at the proper point but the humidity might change.

MR. ELLIS: There are thermostats which, in one instance, the author speaks of as relay thermostats and which the manufacturers call multiple thermostats. These thermostats will open and close the valves of different sections of the tempering or reheating coils, open them wide and close them tight. But at different points you want them set. For instance, in regard to four sections of the tempering coil, you could turn on one section at 59°, one at 69°, one at 70° and one at 71°, and shut them off in reverse proportion. Suppose hydrostats and humidostats were built on the same plan, would they not accomplish the same purpose?

MR. LYLE: Probably, if they were turned on in that way. By applying a multiple hygrostat to a constant temperature, you would get control, probably within, say, 15%. By means of the thermostat you would not get it within 30%.

MR. ELLIS: Would it make any difference if the control were at the intake?

MR. LYLE: Not so far as control is concerned. It would relieve some of the work of controlling the air washer, and is a somewhat safer proposition.

MR. ELLIS: Would the introduction of two sets of tempering coils make any difference? I have in mind an installation in the La Salle Hotel, Chicago, where they have a very elaborate heating system. I do not know that they attempt to control the humidity, but the requirements are to produce a temperature somewhere between 40° and 50° for the air entering the air washer. That

was done by controlling two or three sections of the first tempering coil by means of a thermostat located near the air washer. There is no by-pass damper at all. This arrangement is intended to shut off the inside section at a temperature of 40° or 42°, and the outside section, nearest the air washer at 45°. The air, after going through the air washer, passes through another tempering coil. This latter tempering coil is controlled by a thermostat located in the air chamber, which is set for about 65° or 67°, and shuts off these two sections in that order. Now the reheating coils are controlled from the outside. They are in three sections. All of them were figured on a zero to 70° basis. Half of the sections shut off at 20° outside, half of the remaining sections shut off at 40° outside and the balance when the outside temperature goes up to 70°. I would like to know what effect that would have on the humidity.

MR. LYLE: You have a thermostat on the tempering coil set at 40°. If the outside temperature, we will say, should drop to 38°, the thermostat would turn on one section and immediately after that section started to heat, it would run up the temperature of the air to 53°, so that as soon as it starts, the thermostat shuts it off again. Thus it is regularly on and off. If the outside temperature drops down to 25°, the thermostat will turn on the tempering coil and keep it on, because the tempering coil will not heat the air from 25° up above 40°, at which the thermostat is set. But at any point between 25° and 40°, it is continually going on and off. It is that kind of thing, when the incoming air gets down below 32° that causes freezing in the tempering coil. You do not get circulation established. Your thermostat is placed on one side of the air duct where the steam enters the coil, so that it is affected immediately, and probably no steam reaches the back end of the tempering coil. It is always cold until it gets to the point where the steam is turned on full and left on.

MR. ELLIS: I have never noticed that variation in temperature in the air going into the air washer at this point. There the temperature is held between 40° and 45° all winter. They had a recording thermometer on it a great deal of the time.

MR. LYLE: Have you ever taken readings on the air washer, the temperatures at the inlet and the outlet? I agree with you that if you put the thermostat right on the air washer, you can control that temperature all the time. But I do not believe that on the far side of the coil it can be held within 10° or 15°. That is the point. It is a fact that your thermostat is not extended over the entire area of the tempering coil. Of course, where vacuum systems are used, conditions are very much better, but the vacuum systems cannot do wonders.

MR. ELLIS: The point I was making was that opening the valves wide makes little difference from opening them gradually. If you open them gradually you would get that slow circulation. If you have a large valve, opening wide instantly, with a good vacuum, you would get a good result.

J. H. DAVIS: In connection with a vacuum heating system for a city hall building which I know of, having a constant temperature regulation, in extreme cold weather, such as 8°, 10°, 12°, and 15° below zero, the washer sometimes froze up and it was due to just exactly the causes described by Mr. Lyle. The steam would not entirely fill the heater before the thermostat would shut off the steam. After changes were made so that the thermostat produced its effect by the temperature at the far end of the heater, they had less trouble.

MR. WILLIAMS: Would we not accomplish better results from a moisture standpoint, if we controlled the moistening of the air after the heating was done? You must supply sufficient heat to heat the building. You have to turn on enough steam in the reheating coils to get that result. The more reheating coils you turn on, certainly the more drying effect there is on the air.

MR. LYLE: It is true the more heating coils you put on, the higher the temperature of the air and the more moisture the air will hold. On the other hand, the better method is to fix the amount of your moisture and then heat it to any point you desire, because you are maintaining constant room temperatures in most buildings, and it does not matter how

high you heat the air, it does not take any moisture out of it. Very much more accurate results are secured by fixing your moisture content first and then doing the heating.

MR. SOULE: Considering a school house heating system, entirely hot blast, where we have four sections deep of reheating coil, with plenum chamber, by-pass damper and mixing chamber of humidity control, is it not absolutely necessary to pass the air through an additional coil without any damper in order to limit the humidity down to 95%, so as not to send wet air into the room?

MR. LYLE: That is a very good point. It is absolutely necessary that, with any double-duct system, there should be a tempering coil placed between the air washer and the fan, probably only a single section. We had a case this past winter in a hospital building where there was no tempering coil between the washer and the fan. At times the thermostatic regulation in each room would throw the mixing damper so that it would take entirely the tempered air. That air started at about 50°, I think. Some of the ducts came up along the outer wall and in under the windows. The walls were very thin, with the result that the air was very cool, and when it entered the room it was in the form of a fog. It would come out into the room 6 or 8 ft. before the fog would disappear. In that case a tempering coil had to be placed at the point stated before the trouble was remedied.

MR. FENSTERNMAKER: I agree with the author that it is very difficult to control a tempering coil so that you can control the temperature of the air leaving the fan accurately within a range of 10° or 15°. But the main objection seems to be the freezing up of the tempering coils. Suppose the tempering coils are broken up into smaller units, using, for instance, one or two-pipe sections, or, if the Vento type is used, 40-in. instead of 60-in. to supply the tempering coils on each side, and equipped with a reliable thermostat. It would seem, with that arrangement, that a better condition of air delivery from the tempering coils would be obtained, and then a portion of the air leaving the tempering coils could be taken care of by means of the control of the water in the air washer itself.

MR. LYLE: Do I understand that you are referring to the question of controlling the temperature, rather than the humidity?

MR. FENSTERNMAKER: Yes, the leaving temperature of the coil, before entering the air washer.

MR. LYLE: That can be done, if you split up the tempering coil, as you say, into single pipe coils, within reasonable limits. In fact, with the system of humidity control that I recommend, it is not material whether the air is within 15° or not of the given point when entering the air washer. 15° is sufficiently close. But it is impossible to control the humidity within reasonable limits by controlling that temperature, because that temperature must be constantly varying. In other words, you cannot control the humidity in the air washer by means of the control on the tempering coil, for it will not maintain a constant temperature of the air going into the washer. When the outside temperature remains constant, you have no means of getting the variations of temperature that are required to compensate for changes in outside humidity, and when you do vary it, you get the result of turning on or off one complete section.

National District Heating Association.

At a meeting of the executive committee of the National District Heating Association, held in Detroit, Mich., October 30 and 31, it was decided to hold the next annual convention of the association in Indianapolis, May 27, 28 and 29, 1913. Headquarters will be at the Claypool Hotel.

Papers upon the following subjects were arranged for to be presented at that convention:

District Heating on the Pacific Coast.

Possibilities of Hot Water Heating.

Line Condensation in Different Forms of Construction.

Results of Using Bleeder Turbines.

Appraisal of Heating Properties.

Station Designs with Special Reference to Overland Capacities.

Uses and Abuses of Public Service Commissions.

Hot Water Heating for Residence Districts.

Public Policy.

The report of the committee on meters is working to obtain the experience of those stations that have changed over from flat rates to meter rates and this information, it is expected, will be incorporated in its report.

THE HEATING AND VENTILATING MAGAZINE

Vol. 9 November, 1912 No. 11

PUBLISHED MONTHLY AT

1123 BROADWAY, NEW YORK

BY THE

Heating and Ventilating Magazine Co.

President, A. S. ARMAGNAC
Secretary and Treasurer, G. PETERSEN

The address of the officers is the address of this magazine.

A. S. ARMAGNAC, Editor
G. PETERSEN, Advertising Manager

European Representative:
AMERICAN PUBLICATION BUREAU, 304 High Holborn, London, W. C.

Subscription, - - - - -	$1.00 per year
Canada - - - - - -	1.25 " "
Foreign countries, - -	1.50 " "
Back numbers, - - -	15 cents a copy

DIRECTLY in line with a thought expressed in these columns regarding the enforcement of sanitary measures, including those connected with heating and ventilation, by men especially chosen for that purpose, news is received of the proposed bills that will be reported to the next State legislature by the New York State Factory Investigating Commission. The commission proposes the most far-reaching reforms in this direction that have come to our notice. In the first place, if the commission's proposals are carried into effect, the State labor bureau will be augmented by an advisory board, to consist of a representative of the employers, a representative of labor, a physician, a sanitarian and a ventilating engineer, one of these to be a woman. One of the principal duties of the advisory board will be to establish ventilation standards for different industries. It is recognized that the same standards will not apply universally and the lack of such standards in the present State factory ventilation law is said to be the principal cause of its failure, now generally admitted. It will be remembered that the law contains no statement as to character or quantity of air supply, the authors contenting themselves with the phrase, "proper and sufficient ventilation."

The commission further plans to establish a division of the labor bureau, to be devoted to "industrial hygiene." Here again a ventilating engineer is proposed as one of its members, the others being a medical inspector, a safeguards engineer, a chemical engineer and a fire-protection engineer. This division is to report to the advisory board of the labor bureau, the advisory board to take the findings as a guide for formulating standards for the use of the bureau.

For the purpose of eliciting suggestions and criticisms the commission has drawn up a proposed new factory ventilation law which will be presented at a series of public hearings in New York, commencing November 18. It is not expected that this bill will go to the legislature, at least, in its present form, but it will undoubtedly be the forerunner of a definite substitute for the present law.

NEXT month we shall resume the publication of the weather charts for five representative American cities, covering the daily fluctuations in temperature, humidity and wind. The fact that the government records of the humidity are from observations made only at 8 A. M. and 8 P. M., has been recognized as leaving the charts far from complete in this regard. In the case of the New York City records, we are able to state that provision has been made for procuring more frequent readings of the relative humidity.

THE CONSULTING ENGINEER.

Those engaged in heating and ventilating engineering have often expressed a desire for an opportunity to appeal to an authority in the solution of problems arising in their practice. In an effort to meet this desire, THE HEATING AND VENTILATING MAGAZINE *inaugurates, in this issue, a new department under the title of "The Consulting Engineer."*

In these days no one man may claim to possess ultimate knowledge on engineering questions. His opinions and statements must invariably be subject to the acid test. Thus no degree of infallibility is claimed for this department. Its authoritative value will rest entirely on the accuracy of its statements and on the appeal they make to the reason and judgment of our readers.

"The Consulting Engineer" is prepared to reply, in this department, to any questions which our readers may ask regarding problems connected with the design and installation of mechanical equipments of buildings.

1—Radiation Losses in Single and Double Pipe Systems.

QUESTION—It has been stated that the radiation losses from risers on a single pipe system are greater than on a two-pipe system. Also, that the pipe walls in the former case are at a higher temperature, due to the condensation being in contact with them than if only the steam were present. Are these statements true?

ANSWER—No, they are not. The radiation losses depend entirely on the surrounding air temperature outside and that of the steam within, whether the job is one- or two-pipe. If the aggregate square feet of pipe surface were greater in the single pipe job, the radiation would be greater and vice versa. Inasmuch as all proper heating installations in either case call for covering on the risers, the difference in loss would be negligible.

The second portion of this statement is impossible from the principles of physics. Water and steam in contact in the same receptacle are invariably at the same temperature or there is an immediate interchange of heat. Some of the water is evaporated if the steam is lower in temperature or pressure and, if the water is lower in temperature, some of the steam is condensed to maintain equilibrium. The temperature of the steam will, in all cases, determine the temperature of the riser, whether one- or two-pipe or whether water or steam is in immediate contact with the walls. The amount of loss will be determined entirely by the efficiency of the covering which will cost more for a two-pipe than for one-pipe, for a given capacity.

2—Water Logging of Radiators Fed From Below on a One-Pipe Job.

QUESTION—Difficulties are attributed to one-pipe jobs when fed from below, due to water logging of the radiators, which, it is claimed, are entirely obviated by using a two-pipe system with overhead mains.

ANSWER—The same difficulties are met with in two-pipe jobs that are attributed to the single pipe system, when fed from below. It is always policy and better practice, where possible, to use the overhead, downfeed system, so as to keep the condensation flowing in the same direction in advance of the steam. This is true whether one or two-pipe risers are used. If a difference in pressure occurs between the radiator and riser greater than the available

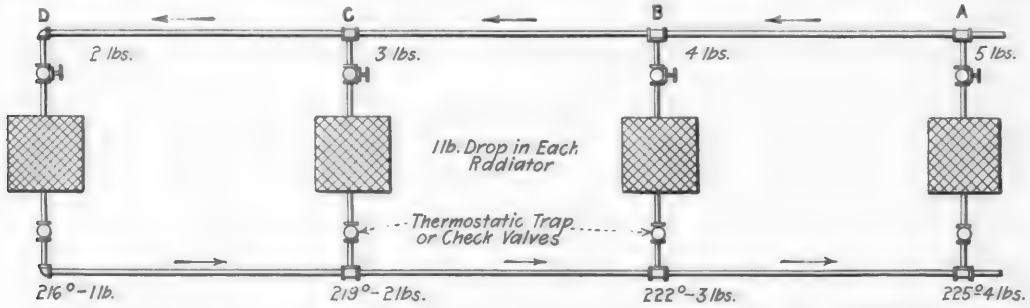


FIG. 1.—THIS DESIGN REQUIRES THERMOSTATIC TRAPS OR CHECKS TO PREVENT BY-PASSING.

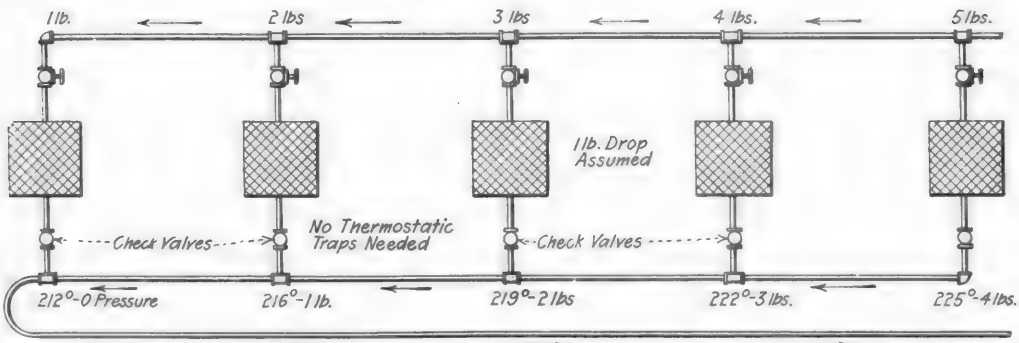


FIG. 2.—ARRANGEMENT OF STEAM OR HOT WATER MAINS TO OBTAIN THE SAME DROP THROUGH THE SURFACE AT ALL POINTS, INDEPENDENT OF THE DROP IN EITHER SUPPLY OR RETURN MAIN.

head of water on the return outlet, the radiator will waterlog just as quickly on a double-pipe job as on a single-pipe. It often occurs, on a two-pipe job, where several radiators are connected, that steam at a higher temperature enters the return from a radiator doing little work and shuts off the next radiator in line, which is more heavily loaded. A check valve will not help this, as the pressure will close it.

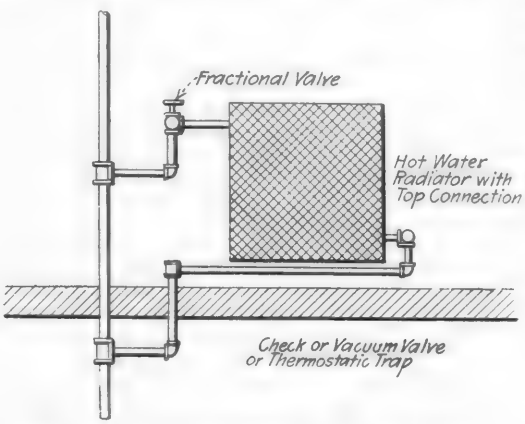


FIG. 3.—ARRANGEMENT OF MODULATION SYSTEM FOR ONE PIPE, DOWN FEED.

A fall of water is necessary to open the return check on the more heavily loaded radiator equal to the difference in pressure either side of the check. It is not always the same radiator on the line that acts in this manner. It is what is known as short-circuiting and occurs as often on hot water jobs as steam, but always where the piping is not arranged properly.

Figs. 1 and 2 show the wrong and correct ways of piping jobs either to buildings or to radiators so that short circuiting will be impossible. Thermostatic traps and checks are unnecessary if this principle is carried out, and it applies equally well to hot water work as to steam work. By this method the distances are balanced, so that each fixture has the same distance from the source, and whatever the drop on the line may be, the relation to the return and the drop through the radiator or building will be the same.

It is readily seen that unless a considerable fall is obtained in the piping as shown in Fig. 1, the return water is expected to flow uphill or from a lighter to a heavier pressure. The only reason the method shown in Fig. 2 is not used is on account of its fancied cost of installation. Fig. 2 shows the pressure dropping in the return with the direction of flow. The improper handling of this feature has been the source of a great deal of trouble on vacuum systems requiring the use of checks and thermostatic drain traps.

There are as many successful single-pipe steam jobs with upfeed as there are double-pipe and perhaps more. The above-mentioned troubles appear just as often with one as with the other and can always be obviated if the piping is properly designed.

3—Amount of Radiation Required With One-and Two-Pipe Systems.

QUESTION—Is less radiation required on a two-pipe heating system than on a single-pipe?

ANSWER—No. The temperature of the steam would be the same, whether the job were single-pipe or double-pipe. If anything, the single pipe would require a greater care and less difference in temperature, due to the troubles of water-logging already cited caused by the difference in pressure between the riser and radiator when working at the maximum capacity. Vapor and vacuum systems require more radiation and larger mains, if anything, due to the lower temperature of steam contemplated and the consequent greater volume per pound.

4—Partially Filling a Steam Radiator With Single-Pipe Connection.

QUESTION—Is it possible to partially fill a radiator with steam when connected with a simple pipe?

ANSWER—Yes, by closing the air valve be-

fore all the air is out of the radiator, leaving some of the sections air bound. This has been done in many cases but, on a good circulating job, the air may work out through the steam pipe after a time. There are many cases where individual tenants do it successfully.

Legal Decisions

Heating Company a Quasi-Public Service Corporation.

Suit was brought against a corporation engaged in supplying heat in the busines center of Baltimore for the appointment of a receiver. The suit was at the instance of a creditor for supplies and a mortgagee intervened. It was held that the corporation, using the beds of the streets of the city under a franchise therefrom, for distributing, through mains and pipes laid under the streets, the heat to thus supply the public throughout a large business section of the city was at least a quasi-public service corporation, especially in view of Maryland Acts 1910, c. 180, creating the Public Service Commission, and placing such corporations, with others, under its control. It was, therefore, within the principle giving persons who have furnished, prior to the receivership of a railroad company, supplies necessary to the existence of the road, a prior claim on the earnings of the property in the hands of the receiver, over the bondholders. In the present case the court, in appointing a receiver of the heating company, with authority to continue the business, gave a creditor for coal furnished to carry on the business an equitable lien on the earnings prior to the rights of bondholders under a mortgage securing corporate bonds, though the mortgage gave a lien on income and profits.—Homer vs. Baltimore Refrigerating & Heating Co., Maryland Court of Appeals.

Recovers From Surety on Original Contractor's Bond.

Action was brought by a board of education, on the relation of a heating company, against a surety on its bond for the original contractors for the erection of heating and ventilating plants in a school. The contract of the original contractor called for the furnishing of one of three systems named, of which the relator owned one. The selection of his system by the original contractor was, therefore, strictly in accordance with the terms of the contract. The original contractor sublet his contract, and the subcontractor sublet the installation of the heating plant to the relator. It was held that there was a privity of contract between the relator company installing the heating system and the original contractor, and the surety on the original contractor's bond was liable for the cost of the heating system. It was immaterial to the surety's liability whether it knew who the subcontractors were at the time of the execution of the bond.—Board of Education vs. United States Fidelity & Guaranty Co., St. Louis Court of Appeals, Missouri.

Liability for Injuries to Workman.

Action was brought for injuries received by the plaintiff while helping to put up a ventilating stack on the roof of a hotel. The plaintiff was in the employment of the defendants in their boiler works, and was sent by their foreman to put up the stack along with two other men. The stack was made of heavy sheet iron, and in sections, which had to be hoisted from the ground to the top of the building, and the sections there put together. A hoisting appliance was erected and while a heavy section was being raised by a number of men pulling upon the rope attached to the section, the wall gave way beneath the pole from which depended the hoisting tackle, and some of the bricks fell, one of them striking the plaintiff on the head. It was held that it was the defendant's duty to use reasonable care to provide reasonably safe hoisting appliances for lifting the sections to the top of the building. The plaintiff was a boiler maker's helper and the work of erecting the hoisting tackle was in charge of a boiler maker in the defendant's employ. It was held that the question whether the boiler maker was foreman of the gang and engaged in superintendence, in regard to the choice of hoisting appliances used and the method of using them, or whether he was merely the plaintiff's fellow servant, was for the jury to decide. The jury found that he was the foreman. It was also held that the fact that it was the insecure construction of an appliance necessary to any safe performance of the work in hand made it the duty of the master to supply it, or provide competent supervison for its construction. The plaintiff had the right to assume, without going on the roof to inspect it, that the appliance was safely constructed. Judgment for the plaintiff was affirmed.—Hicks vs. Jenkins, Washington Supreme Court, 123 Pac. 526.

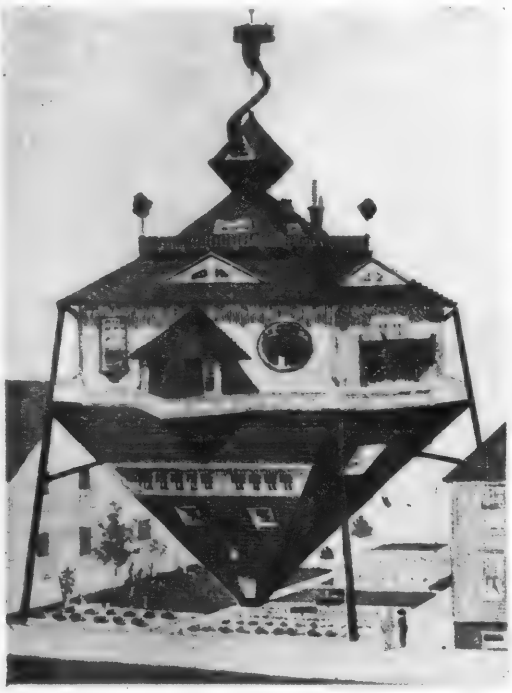
Right of Tenant to Remove Heater.

The lessee of a store installed a steam heater therein which she intended to remove at the end of the lease, but before its expiry she entered into a second lease of the premises. She assigned that lease to another and sold him the heater and he sold it to the defendant, who removed it during the term of the lease. In an action by the lessor for pos-

session of the heater it was held by the New Hampshire Supreme Court that his right to maintain the action depended on whether the first tenant intended to give him the heater when she accepted the second lease, or did anything which stopped the defendant to deny that that was her intention.—Ferguson vs. O'Brien, New Hampshire Supreme Court.

A Solution of the Fresh Air Problem.

While doctors and engineers are debating the best means for supplying buildings with fresh air, an idea, shown in the accompanying illustration, is proposed by *Judge*. The design, according to the artist's idea, provides a solution for the increasing cost of land. Although the building is of the same dimensions as the lot, it will be noted that ample space is provided for use of most of the land on which the house stands. The artist seems



A SOLUTION OF THE VENTILATING PROBLEM.

not to have thought of the possibilities of the design in connection with good ventilation, but this will, no doubt, readily occur to our readers.

Building Cost Data.

An interesting table of building cost data for approximate estimates and appraisals has been made up by Duncan M. Robertson, compiler of architects' specifications and data, 150 Fifth Ave., New York, and is shown herewith. It will be noted that the cost is based on per cubic foot of building contents exclusive of scenic or other features, lighting fixtures, mural and art painting, incidentals, etc.

COST DATA.

FOR APPROXIMATE ESTIMATES AND APPRAISALS

	TYPES OF CONSTRUCTION			
	ORDINARY	FIRST CLASS	HIGH GRADE	ELABORATE
Architect's Fee	1⅛	1¼	1⅜	1¼
*Brick and Brick Work	4	4½	5¾	6⅝
Bronze and Brass Work	¼	¼	½	⅜
Carpenter Work	4⅛	1⅛	2⅜	3¼
Cast Iron	¾	⅜	1⅛	1⅜
Composition Flooring		⅛	¼	⅜
Concrete	1/16	⅔	⅞	1¼
*Concrete Block Work	3	3	3⅛	4¼
Concrete Reinforcement		½	⅝	1¼
*Cut Stone and Cut Stone Work	3 1/16	6	6⅝	8½
Electric Work	¼	⅔	⅞	1½
Elevator Work	⅔	1	1¼	1¾
Excavation	¼	¼	⅜	⅜
Foundation Work	¾	1¼	1⅜	2¼
Gas Fitting	1/10	⅛	1 1/16	1¾
Glass and Glazing	1/16	1/16	¾	⅞
Hardware	⅛	3/16	3/16	⅝
Heating and Ventilating	1⅛	1¼	1¾	1⅞
Lathing	¼	¼	⅜	⅜
Onamental Metal Work	¾	1⅛	1⅛	1⅞
Painting	½	¾	1⅛	2⅜
Plastering	1⅞	1⅞	1⅞	2¼
Plumbing	½	¾	1⅛	1⅛
Power Plant	¾	¾	1⅛	2⅛
Roofing and Accessories	½	¾	1⅛	1⅜
Sheet Metal	⅛	½	½	⅞
Skylights	1/30	1/10	1/16	¼
Structural Steel and Iron	⅞	2½	2½	2½
Stucco Work	⅞	1¼	1¼	1¾
*Terra Cotta and Faience (Trim)	½	⅞	⅞	1¼
Terra Cotta Blocks	⅛	⅔	⅔	⅞
Tiling and Mosaic	¼	⅜	⅜	⅜
Waterproofing and Dampproofing	⅛	¼	⅜	⅜

*These items are alternates for exterior work and are used or omitted as design may determine. For interior work, the averages are approximately correct.

The charges for these particular items range from 6½ to 7 4/5 cents per cubic foot. The figures given in the accompanying table are cents per cubic foot.

New Publications.

The Coking of Coal at Low Temperatures, with a Preliminary Study of the By-Products, by S. W. Parr and H. L. Olin, has just been issued as Bulletin No. 60 of the Engineering Experiment Station of the University of Illinois. This bulletin reports the results of experiments on various types of Illinois coal with reference to the principles which govern their use in the production of coke. The temperatures used do not exceed approximately 750°F. Reference is also made to the by-products obtained at the temperatures employed. Copies of the bulletin may be obtained from W. F. M. Goss, director of the Engineering Experiment Station at the University, Urbana, Ill.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

Illinois Chapter Opens Season.

The activities of the Illinois Chapter were resumed at a meeting held at Vogelsang's Restaurant, Chicago, October 14, when reports for the year were read and new officers elected. President S. R. Lewis was in the chair when the meeting was called to order, after full justice had been done to the dinner which preceded the business session. The following officers were elected: President, J. M. Stannard; vice president, George H. Getschow; secretary, W. L. Bronaugh; treasurer, August Kehm; board of governors, S. R. Lewis, R. A. Widdicombe and L. C. Soule. New members elected were William Lees, Herbert K. Lees, Jr., and J. E. Miller, Jr.

It is planned to make the work of the new ventilation bureau in Chicago the principal for discussion at the November meeting, when it is expected that Dr. E. Vernon Hill, inspector-in-charge, and a number of his staff will be present and explain the present and contemplated work of the bureau.

New York Chapter's First Annual Meeting.

The first anniversary of the New York Chapter of The American Society of Heating and Ventilating Engineers was celebrated October 15 at the headquarters of the parent body in the Engineering Societies Building, New York. Reports were presented for the year, followed by the announcement of the officers elected for the ensuing year. They are: President, Frank G. McCann; vice president, D. D. Kimball; secretary, Joseph Graham; treasurer, Arthur Ritter; board of directors, Wm. M. Mackay, Conway Kiewitz and W. W. Macon. The secretary's report showed that the present membership of the chapter is 72, of which 65 are full members, 2 are honorary members, 3 associates and 2 juniors. The treasurer reported a balance on hand of $99.75.

The business session was followed by a discussion of the relative efficiency of wrought-iron pipe coils and cast-iron heaters. Frank G. McCann stated that it was his practice to figure on a higher rate of transmission for wrought-iron, but that he found it necessary to specify an extra amount of wrought-iron surface on account of its tendency to scale.

Arthur Ritter called attention to the effect on cast-iron heaters in cases where the air velocities are high. Under these conditions, he said, the fins become cooled. This, he said, would not apply to prime surface, where increased air velocities would give increased efficiency on the part of the heater.

One of the subjects that will be discussed at the next meeting in November is the matter of fees for heating engineers.

British Institution of Heating and Ventilating Engineers.

New officers were elected at the autumn meeting of the British Institution of Heating and Ventilating Engineers, held in London, October 16, J. E. Hartley, of Halifax, being chosen president, and S. Naylor, Halifax, vice-president.

The paper on the programme was by A. H. Barker on "The Theory and Limitations of Approximate Calculations in Heating and Ventilation." In the evening, the members discussed the papers read at the summer meeting, including one by A. H. Barker on "Observations of the Conditions of Guarantees," and one by Charles Knuth, Jr., of Budapesth on "The Determination of Pipe Sizes for Hot Water Heating."

Exhibit of Heating and Ventilating Methods

An exhibit, showing the best methods of lighting, heating and ventilating factories and offices has been installed in the new headquarters of the Illinois Department of Factory Inspection in Chicago. The headquarters are equipped throughout as a model to promote efficiency in these respects. Equipped with a library, laboratory, reading rooms, lecture hall, drawing department and exhibit rooms, the headquarters are regarded as the most novel method ever adopted by any labor bureau to instruct factory owners and employees.

The rooms devoted to the department were built according to plans drawn by Edgar T. Davies, chief inspector of the Illinois Department of Factory Inspection. The arrangement of desks and offices has many unique features, intended to show the best methods for obtaining efficient work and assuring safety to the employees.

A Novel Spray Head.

An unusual type of spray head for moistening the air in a heating system was referred to by S. R. Lewis in connection with his description of the heating and ventilation of a mitten factory, read at the summer meeting of the heating engineers' society and published in THE HEATING AND VENTILATING MAGAZINE for August, 1912.

"I tried a new form of spray head, which proved very satisfactory. The ordinary device for putting the steam into contact with the air, used with automatically-controlled humidifying

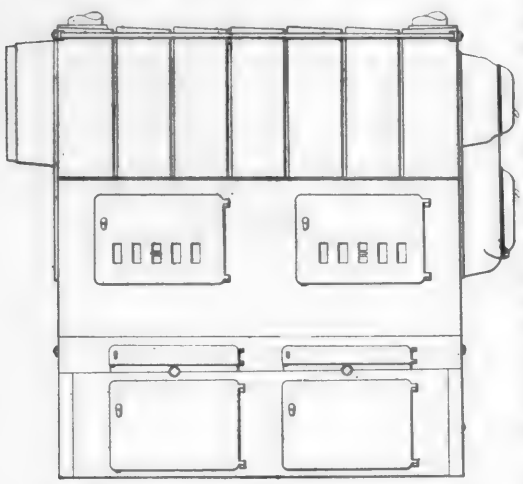
installations, consists of a wick-wrapped perforated pipe. The wicking gets dirty and rots and the contact between the steam and the air is not very intimate.

"I remember having driven a well once and a well point occurred to me as a good spray device. Well points may be purchased at a very low price from supply houses and may be had in 1-in., 1½-in. or 2-in. diameters, and in lengths up to about 36-in. They are made of brass pipes drilled full of small holes and covered with very fine-mesh, heavy brass screens. I made up a manifold of these, covering the face of the tempering coils, using six, I think, on a tempering coil 6 ft. wide and 8 ft. high. The results were satisfactory."

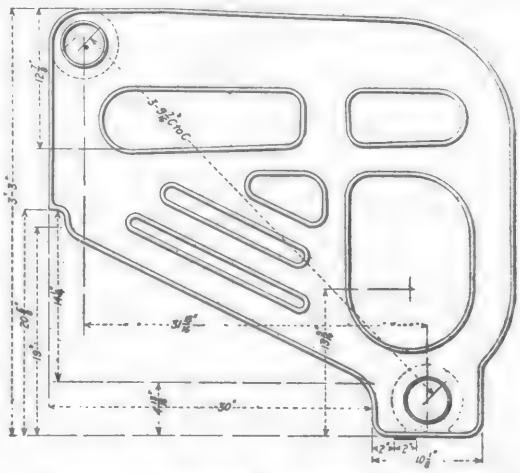
New Type of House Heating Water-Tube Boiler.

A boiler of the side-feed type, constructed on the water-tube principle, has lately been designed by J. B. Bernhard, 618 West Genesee St., Syracuse, N. Y., the inventor of what is now known as the Progress boiler. The feature of the new design is in connection with the fire travel, which is different from that of any boiler now on the market. After passing up between the water tubes and striking the crown sheet, the products of combustion flow to the back of the boiler at one end, rising thence to the upper flues and back to the other end, thus making three distinct and different courses. The boiler has a very low water-line, so that it can be installed in a low basement without necessitating the digging of a pit.

From a manufacturing standpoint, an important feature of the boiler is that with but fifteen different hollow castings, it is possible to build 100 different sizes of surface-burning boilers and twenty sizes of magazine-feed boilers.



30-IN. BERNHARD WATER TUBE BOILER.



INTERMEDIATE SECTION OF 30-IN. BERNHARD WATER TUBE BOILER.

The boiler will be built in three series, having grates 20 ins., 30 ins., and 40 ins. wide. The accompanying illustrations show a seven-section boiler, also one of the intermediate sections.

Turbine Ejector Pump for Vacuum Heating.

Many interesting features are combined in the turbine ejector pump, shown herewith, manufactured by the Fischer-Sweeny Bronze Co., Hoboken, N. J. The pump is designed for vacuum heating work and the aim has been to secure high efficiency with simplicity of design and operation.

The apparatus consists of a motor-driven centrifugal pump, a turbine ejector or vacuum head, a water storage tank and an automatic controlling device, all of which are mounted on a single bedplate and form a self-contained unit.

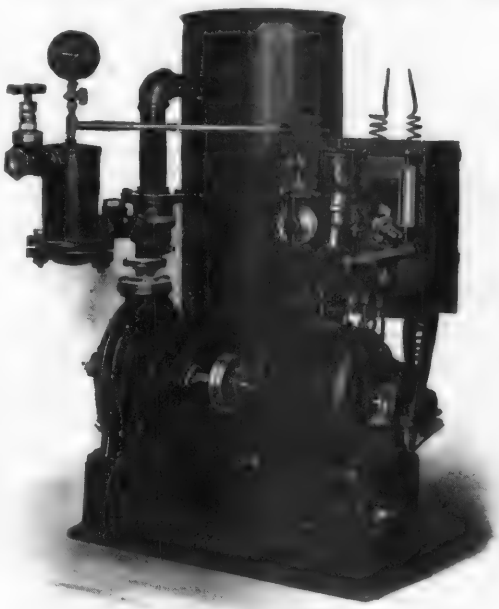
The motor-driven centrifugal pump forces a high velocity stream of water through the concentric turbine ejector (or vacuum head), exhausting a large volume of air and producing a high and steady vacuum. The discharge water from the vacuum head is delivered into the storage tank, together with the air and condensation from the heating system. Any sand, pipe scale or other foreign matter from the heating system cannot enter the moving parts, but are delivered directly into the tank, where they settle to the bottom. The tank is arranged for the easy removal of sediment and for refilling with clean water.

The automatic switch and vacuum regulator start and stop the pump at any predetermined vacuum within the range of 5 and 29 inches.

On return line systems where a high vacuum is not required, the pump is run continuously to take care of condensation as fast as it is returned, eliminating the necessity for an automatic switch and vacuum regulator. In its place a starting switch mounted upon a marble board is provided.

On return line low pressure systems, where the initial boiler pressure does not exceed 10 lbs., the condensation may be returned direct to the boiler. On high pressure systems it is discharged into the sump well or feed water heater.

In addition to the advantage of high efficiency, other features emphasized are the minimum number of moving parts, insuring freedom, trouble and expense due to wear,



TURBINE EJECTOR PUMP FOR VACUUM HEATING.

absence of belts, pinions or any gearing between motor and pump; absence of valves, springs or intricate lubricating devices; stationary jets of composition bronze in vacuum head (guaranteed for five years) and easily renewable; oiling required at infrequent intervals, instantaneous operation upon closing of motor circuit and operation without expert attention. The apparatus is furnished complete, ready for connection to power lines, without the introduction of any intermediate switches.

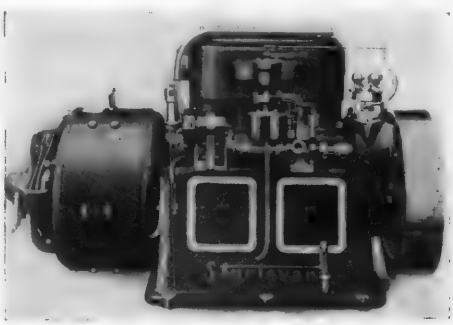
Gasoline Electric Generating Sets.

A new line of gasoline electric generating sets has lately been placed on the market by the B. F. Sturtevant Co., Hyde Park, Mass. The sets are intended to operate without using a storage battery for an equalizer, as is generally necessary with gasoline electric generating sets, although such a battery may be used if power is desired when the generator is not in operation. This feature is obtained by means of a governor, which controls the speed so closely that the voltage variations between no load and full load and under sudden fluctuations of load is very slight. The set is found to be altogether as reliable and as satisfactory in operation as highly developed steam-driven generating sets of the same size.

These generating sets consist of Sturtevant gasoline engines direct connected to Sturtevant electric generators. The engine is of the four-cycle, water cooled, automobile type, with either four or six cylinders, according to the size. The sets are at present built in three sizes, 5, 10 and 15 K.W.

The vertical multi-cylinder, automobile type engine has been chosen by the makers as being the most reliable, the best adapted for steady, continuous service and the most familiar form of the gasoline engine. It is, therefore, the most satisfactory type that could be chosen, since no experienced engineer is necessary for its operation. It is particularly adapted to the lighting of country estates, hotels, and apartment houses, ships, garages and for power purposes in factories or on farms. It requires little attention and may be placed in the garage, basement, shop or engine room, where it is out of the way.

These sets are built in the shops of the B. F. Sturtevant Co., whose steam engine generating sets have been for years standard equipment in the United States Navy. The same



5 K.W. STURTEVANT GASOLINE ELECTRIC GENERATING SET.

workmanship, design and construction that characterizes the steam units is found in these gasoline generating sets.

Catalogue No. 205 of the Sturtevant Engineering Series, which may be obtained from the company's various offices, describes these motors and gives interesting information regarding actual fuel consumption and efficiency.

Typhoon Fans.

An interesting propeller type of fan, built on the multiblade principle, is being marketed by the Typhoon Fan Co., 1544 Broadway, New York, and is known as the Typhoon Fan. As will be seen from the accompanying illustration, the Typhoon fan is made with a special design of blade, which has been found to give the most effective results. It is built with any number of blades, and of a width

TYPHOON FAN.

and pitch to meet special requirements. The stock sizes run from 30 in. to 72 in. for the diameter of the fan, with capacities of from 4,570 to 9,139 cu. ft. per minute for the 30-in. fan and from 26,244 to 52,488 cu. ft. per minute for the 72-in. fan. The company also makes a brick-set type of similar sizes and capacities.

New Books.

PRACTICAL STEAM AND HOT WATER HEATING, by Alfred G. King, has appeared in its second edition. The book has been revised and now contains 402 pages as against 367 pages in the previous edition. The new matter is made up principally of rules, tables and other information on the temperatures and movements of air, volumes and velocities, sizes of ducts, etc., as used in computations for the blower system of heating and ventilation. This, with the large fund of data previously published, adds much to the value of the book. The volume is well-illustrated and will no doubt maintain its reputation as one of the most complete treatises of its kind on the elements of heating and ventilating practice. Sizes 6 x 9½ ins. Pp. 402. Cloth, $3.00. Published by the Norman W. Henley Publishing Co., 132 Nassau St., New York, or may be had from the book department, Heating and Ventilating Magazine Co.

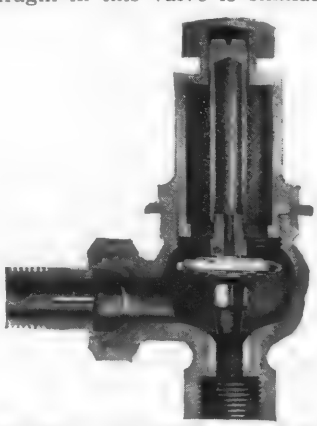
Trade Literature.

VENTURA DISC VENTILATING FANS are featured in a unique circular, shaped like the fan it describes, and illustrating both base and wall types. The fan is made by the American Blower Co., Detroit, Mich.

RICHARDSON DIRECT READING SLIDE RULE is the subject of a new catalogue published by Geo. W. Richardson, 4212-4216 Twenty-fourth Place, Chicago, Ill. The manufacturer states that, in addition to his line of 10-in. celluloid slide rules, he also makes a 5-in. vest pocket slide rule of the same materials, which is but ⅛-in. thick. He also states that he is prepared to give a 10-in. rule, with Bristol board scales, free to each purchaser of his new book "The Slide Rule Simplified," which sells at $1.

SIROCCO FORCED DRAFT FANS, as installed on the U. S. S. Utah and Florida are shown in newly-issued circulars of the American Blower Co., Detroit, Mich. Each ship is equipped with twelve of these units. The company states that in addition to numerous vessels of the United States Navy equipped with Sirocco fans, practically the entire British navy and most of the vessels of other navies, including that of Japan, have Sirocco fan equipment, built at Belfast.

MARSH REFLUX RETURN LINE VALVE, for use on the return end of radiators of low pressure, vapor and vacuum heating systems, is described in new circular matter published by James P. Marsh & Co., manufacturers of steam specialties, Chicago, Ill. The expanding diaphragm in this valve is similar to that



MARSH REFLUX RETURN LINE VALVE.

used in locomotive gauges. A special feature of the valve is the fluid reservoir, which, together with the composition seat, relieves the force of the expanding member. The reservoir is a tube containing, with the diaphragm, the volatile fluids. A composition seat enables the valve to close noiselessly.

DETROIT MULTI-PORT VAPOR VALVE, described as a valve which can be accurately and delicately adjusted to pass the proper

amount of steam to supply any given amount of radiation at any distance from the boiler, is a new product of the American Radiator Co., Chicago, Ill. It differs from the ordinary type of fractional valve in that it is not necessary to choose a different valve for each radiator or figure out any allowance for loss of steam pressure due to friction or condensation. One standard size works for all radiators. The maximum area of supply opening in this valve is 0.387 sq. in., and this can be gradually decreased to zero, with the indicator at "hot." A series of intermediate maximum areas can thus be obtained and permanently established for the fractional adjustment.

HERRINGBONE GEARS are the subject of a new catalogue from the Earle Gear and Machine Co., Philadelphia, Pa. The company states that it has installed gears of this type which are successfully running at 6,000 R. P. M. and that it is possible to operate them at a mile a minute on the pitch line. Size, 6 x 9 in. (standard). PP. 12.

KAUFFMAN DUSTLESS RADIATOR SHIELDS are featured in new circular matter published by the Kauffman Heating & Engineering Co., St. Louis, Mo. The shields are made for all heights, types and sizes of radiators, also for wall radiators.

J.-M. POWER EXPERT for September, 1912, published by the Cleveland, O., branch of the H. W. Johns-Manville Co., gives further details of the uses of the Audiffren-Singrun refrigerating machine, which was illustrated and described in THE HEATING AND VENTILATING MAGAZINE for September, 1912.

VALVE WORLD for October, 1912, published by the Crane Co., Chicago, contains as its leading article a discussion of the "Trend of the Modern Power Plant." The article of illustrated.

A Statement.

Statement of the ownership, management, etc., of THE HEATING AND VENTILATING MAGAZINE, published monthly at New York, N. Y., required by the Act of August 24, 1912.

Note—This statement is to be made in duplicate, both copies to be delivered by the publisher to the Postmaster, who will send one copy to the Third Assistant Postmaster General (Division of Classification), Washington, D. C., and retain the other in the files of the post-office.

Editor, A. S. Armagnac, 375 Upper Mountain Ave., Upper Montclair, N. J.

Advertising Manager, G. Petersen, 216 Eleventh St., Hoboken, N. J.

Publisher, Heating and Ventilating Magazine Co., 1123 Broadway, New York, N. Y.

Owners (if a corporation, give names and addresses of stockholders holding 1% or more of total amount of stock):

A. S. Armagnac, 375 Upper Mountain Ave., Upper Montclair, N. J.

G. Petersen, 216 Eleventh St., Hoboken, N. J.

Known bondholders, mortgagees and other security holders, holding 1% or more of total amount of bonds, mortgages, or other securities:

None.

(Signed) A. S. ARMAGNAC, President.
GUSTAVE PETERSEN,
Secretary and Treasurer.

Sworn to and subscribed before me this 30th day of September, 1912.

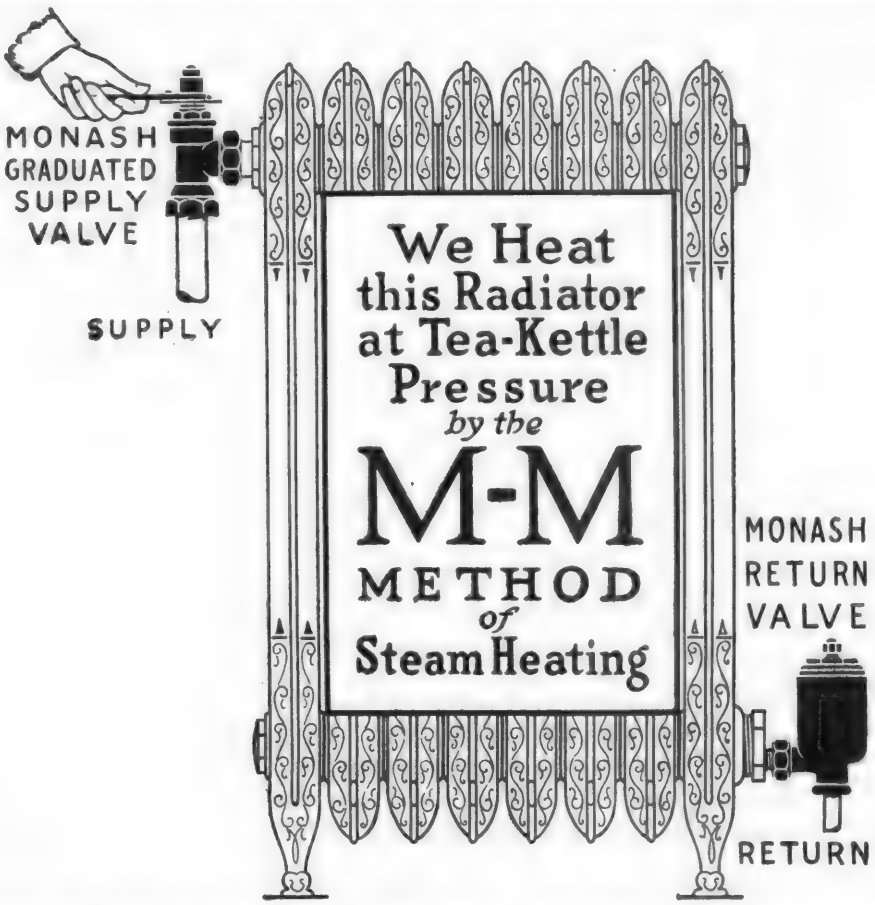
(Seal)

(Signed) A. L. SCANTELBURY,
Notary Public, No. 247.

(My commission expires March 31, 1913.)

ADVERTISERS' INDEX

Alberger Pump & Condenser Co..... 8
American Blower Co..... 52
American District Steam Co..... 8
American Radiator Co.....Back Cover
Applied Heating and Ventilation..... 63
Armstrong Cork Co..... 61
Armstrong Mfg. Co..... 47
Automatic Vacuum Pump Co..... 3
Bicalky Fan Co..... 10
Books on Heating and Ventilation.... 62
Bristol Co., The.....Front Cover
Buffalo Forge Co.....Inside Back Cover
Carrier Air Conditioning Co of America, Inside Back Cover
Central Station Steam Co..... 50
Central Station Heating..... 65
Connersville Blower Co..... 3
Crosby Steam Gage and Valve Co., Front Cover
Dixon Crucible Co., Joseph..... 49
Dunham Co., C. A..... 10
Fischer-Sweeny Bronze Co..... 64
Fitzgibbons Boiler Co..... 61
Foster Engineering Co..... 66
Garden City Fan Co..... 56
Globe Ventilator Co.....Front Cover
Green Fuel Economizer Co..... 6
Gurney Heater Mfg. Co.....Front Cover
Hackney Ventlating Co..... 65
Ilg Electric Ventilating Co..... 4
Industrial Instrument Co..... 50
Jenkins Bros. 49
Johns-Manville Co., H. W..... 50
Johnson Service Co..... 57
Knowles, Geo. E.....Front Cover
Michigan Pipe Co.....Front Cover
Monash-Younker Co..... 46
Morehead Mfg. Co..... 5
Mueller Mfg. Co., H..... 66
Patterson & Co., Frank L..... 59
Ross Valve Mfg. Co.....Front Cover
Simmons Co., John....Inside Front Cover
Sturtevant Co., B. F..... 53
Thomas & Smith..... 54
Typhoon Fan Co..... 60
Warren, Webster & Co..... 55
Zellweger & Sons, J..... 48



THE MONASH MODULATING METHOD

provides for the complete control of each individual radiator by the occupant of the room, supplying

GRADUATED HEAT

JUST as it is wanted and **WHEN** it is wanted

Less expensive and more efficient than a Hot Water Heating System

WRITE FOR PARTICULARS

MONASH-YOUNKER CO.

121 W. 42nd St., New York **1420 W. Jackson Blvd., Chicago**

TRADE AND MISCELLANEOUS NOTES

Coming Events.

THIRD TUESDAY IN EACH MONTH.—Meeting of the New York Chapter of the American Society of Heating and Ventilating Engineers, at the Engineering Societies Building, 29 West 39th St., New York.

DECEMBER 3-6, 1912—Annual meeting of the American Society of Mechanical Engineers. Headquarters at the Engineering Societies Building, New York.

DECEMBER 4-6, 1912—Fifth annual meeting of the American Institute of Chemical Engineers, at Detroit, Mich.

Deaths.

HERBERT A. JOSLIN, a well-known figure in the heating and ventilating trade and a prominent member of The American Society of Heating and Ventilating Engineers, died at his home in Boston, October 3. He had been ill for two years, but the immediate cause of his death was heart failure. Mr. Joslin was 54 years old. He served his apprenticeship with Frederic Tudor & Co., of Boston, and later became associated with O. N. Evans & Co. He was for several years manager of the New York branch of the Consolidated Engineering Co., of Chicago. He joined the American Society of Heating and Ventilating Engineers in 1896.

ANDREW HARVEY, president and general manager of A. Harvey's Sons Mfg. Co., Ltd., Detroit, Mich., manufacturers of the Harvey gate valve and other heating and plumbing supplies, died at his home in Detroit, October 9. Mr. Harvey had been confined to his home for several months. At the time of the summer meeting of the heating engineers' society in Detroit, Mr. Harvey was too ill to participate in the meeting, although he had been made a member of the entertainment committee. He was a former president of the society, having served during the year 1904. Mr. Harvey was 69 years old. He was a Scotchman and had many typical Scotch traits, including a ready wit and a keen sense of humor. He was a frequent after-dinner speaker at meetings of the heating engineers' society and always had a word of sound counsel to accompany his remarks. Although not the founder of the business identified with his name, Mr. Harvey was responsible for its growth to its present proportions and took much pride in maintaining its prestige and reputation. The business was founded as a foundry and machine shop by his father, who came to Detroit from Scotland when Andrew Harvey was a child. There he served his apprenticeship as a mechanic. On the death of his father, Mr. Harvey succeeded to the management of the business.

WILLIAM HORACE CORBIN, vice-president of the Joseph Dixon Crucible Co., Jersey City, N. J., died at his home there September 25.

Miscellaneous Notes.

MANUFACTURERS' STANDARD SCHEDULE of flanged fittings for standard and extra heavy pressures, which was put into effect by the Manufacturers' Committee on Standardization, October 1, has been published in pam-

Genuine Armstrong Stocks and Dies

MALLEABLE HINGED PIPE VISES

PIPE CUTTERS

PIPE MACHINES, HAND OR POWER

The Tools of Constant Service

Manufactured by **Write for Catalog**

THE ARMSTRONG MFG. CO., 321 Knowlton St., BRIDGEPORT, CONN.

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

phlet form and is being sent out from the committee's headquarters at 30 Church St., New York. The pamphlets contain illustrations and other details of the new fittings adopted by the committee, including those for service up to 125 lbs. per square inch, as well as the extra heavy fittings for use up to 250 lbs.; also templates for drilling low pressure standard and extra heavy flanges and flanged fittings.

TOLEDO, O.—The ordinance repealing the franchise of the Toledo Railways & Light Co. to operate its Yaryan heating lines in the streets of the city became effective October 7, without the mayor's signature. It is stated that the company will continue to furnish service to those who have signed contracts until the case is decided by the Public Utilities Commission. Hearings before that body were begun October 18. Less than 100 of the 800 users of Yaryan heat are holding out until the case is settled.

MIDDLETOWN, N. Y.—Plans for a new heating plant for the State armory at Middletown are being drawn up, the work having recently been authorized by the Board of Supervisors. William T. McCaw, of Newburgh, is the chairman of the board.

OGDEN, UTAH.—The Union passenger station at Ogden will be heated from a new heating plant, now in process of construction, located across the railway tracks and south of the subway. In addition to furnishing heat for the station building, the plant will supply steam for heating the passenger coaches parked in the yards. Oil will be used for fuel.

STURGEON BAY, WIS.—The municipal heating plant will be extended on Cedar Street for a distance of 350 ft. in response to the requests of business men on that street. The work has been commenced by A. J. Wiest & Co., at their bid of $1,423. This will make 22 business buildings in the city supplied with heat from the central station.

SPRINGFIELD, ILL.—Extensions to the mains of the Springfield Utilities Co., now under way, include a new section of mains to be added to the present terminal at Fourth and Monroe Sts., and extending down Monroe St. to Third St. This will take the place of the contemplated new sub-heating plant which was to be located on Third St., between Adams and Monroe Sts. Increased pressure will be used on the mains from Station A, to prevent a recurrence of the troubles experienced last winter in connection with insufficient heat supply.

ST. LOUIS, MO.—Among the five health bills drafted by the Board of Health is one

THE ZELLWEGER
Air Washing and Cooling Fan

PATENTED

is a centrifugal fan, in which air is purified, humidified and cooled by intimate, forcible and repeated contact with water on the surfaces of a large rotating filter ring, consisting of several layers of close meshed wire screens, through which the air has to pass.

It purifies the air most effectively, as is shown by the cooling of the same to near the theoretical limit.

It will produce and maintain any desired humidity.

It cools air from outdoors 5° to 20° F., and in the hottest summer time the air delivery is seldom above 80° F.

The machine automatically recirculates the wash water, and regulates the supply of fresh water.

The vanes of the rotating eliminator propel air, and enable the machine to furnish more air for equal power than a combination of any fan with a spray-washer, separate pump and stationary eliminator.

This washer is a most compact and self-contained machine, which performs the four different functions of blowing air,—of washing air,—of eliminating the water drops and mist from the air—and of recirculating the wash water, all in one operation.

It is self-cleaning, uncloggable and requires no special attention.

The Public Schools of St. Louis now have in operation and contracted for twenty-four Zellweger Air Washers, for heating, ventilating and cooling purposes.

May we send you our Catalogue?

J. ZELLWEGER & SONS

1900 Adelaide Avenue **St. Louis, Missouri**

regulating the heating and ventilating of street cars in St. Louis. This, as well as the other health bills, has been indorsed by the Central Council of Civic Organizations, composed of representatives from 18 neighborhood improvement organizations.

WILMINGTON, DEL.—Arbitrators have fixed $9,250 as the value of the Centreville Light, Heat & Power Co., which is to be purchased by the town of Centreville.

ELK RIVER HEAT, LIGHT & POWER CO., Cowentown, Del., is preparing to put its plant in operation again. The section of the dam, which was washed away several months ago, will be repaired. The company is represented by E. W. Maloney.

FRESNO, CAL.—By means of circular letters to its valley agents, the Santa Fe Railway Co. is making an effort to create a demand for upper berths in Pullman cars on the ground that they provide less dust, and better ventilation.

SIOUX CITY, IA.—A new train heating plant to cost $10,000 is one of the features of the Milwaukee railroad improvement plans for the Sioux City terminal in 1913.

BALTIMORE, MD.—Holders of the 5% bonds of the Baltimore Refrigerating and Heating Co., which was succeeded by the Terminal Freezing & Heating Co., have received checks from the Continental Trust Co., trustee, which represents the distribution made among bondholders under order of the court in the matter of the receivership procedings of the former corporation. In all the trustee was directed to pay $260,741 in settlement of 1,267 bonds outstanding, and each security holder received in settlement $206.87 for each bond of $1,000 denomination. The bonds, it is understood, were originally placed at around 87.

FAIRBURY, ILL.—An agitation for a central heating plant for Fairbury is being conducted by the local press of that place.

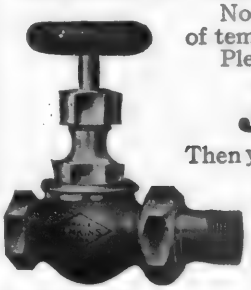
CHICAGO, ILL.—Further comments on the heating and ventilating plant installed in the city hall were brought out at a recent meeting of the council committee, when the architects, Holabird & Roche, stated that the building was now ready to be formally turned over to the city. L. E. McGann, commissioner of public works, called the attention of the committee to the leaky windows of the city hall, which were one of the principal reasons for the unsatisfactory heating of the building last winter. "It was stated that in the specifications," he said, "that the heating and ventilating apparatus would keep the interior of the building at 70° F. winter and summer. The system does not give enough heat in the winter and does not give enough cool air in the summer to come anywhere near the temperature stated in the specifications." Approximately $2,000,000 is yet to be paid to contractors for work on this building. Action was deferred.

NEW ALBANY, KY.—Plans for a hot water heating system for the City Hall building have been submitted by a special committee, of which Councilman Benjamin Jackson is chairman, and a contract for installation will be made shortly. The building is now heated by a hot air furnace.

WASHINGTON, D. C.—A new system of ventilation is to be installed in the Treasury Building. The proposed system has the ap-

BETTER THAN LEAD Dixon's Pipe Joint Compound is better and cheaper than red or white lead.
Doesn't "set" joints—goes farther.
JOSEPH DIXON CRUCIBLE COMPANY, Jersey City, N. J.

PERFECT SERVICE DEPENDS UPON THE VALVE



No matter how fine the system, a leaking valve makes regulation of temperature impossible.
Please your clients by specifying the **genuine**

Jenkins Bros. Valves

Then you are assured of receiving valves which are thoroughly reliable, absolutely guaranteed, and ultimately the most economical.
Send for our catalogue. It will be mailed free on request.

JENKINS BROS.
NEW YORK BOSTON PHILADELPHIA CHICAGO

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

proval of Chief Clerk Wilmeth, Sanitary Officer Jennison and of Dr. Warren, of the Public Health Service, official inspector of hygiene of the Government departments. This is said to be one of many similar improvements planned or already executed under the crusade for better sanitation and hygiene in the Treasury Building. The new system will supersede one installed several years ago which took air from the west basement court. Trouble from coal dust has always been experienced, due to the proximity of the intake to the coal storage cellars. The new intake will be located above the roof of the center court.

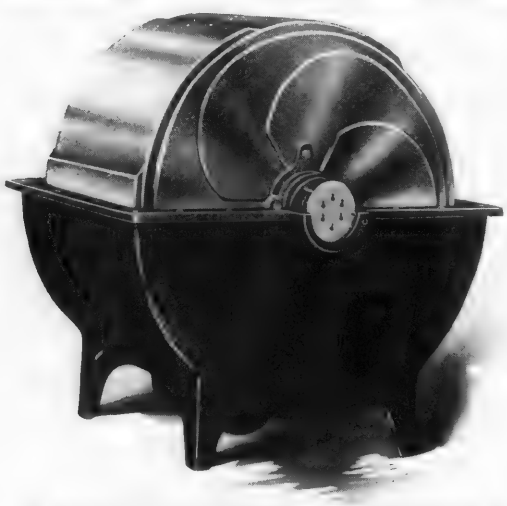
WEBSTER CITY, IA.—A central station heating plant will be built by a number of the prominent citizens of Webster City who have organized a company for the purpose, known as the Business Men's Heating Co., and capitalized at $5,000. Each of the shareholders will be provided with heat for his place of business. The directors of the company are C. Burleson, F. F. Cash, H. R. Dodge, Julius Bermann and O. G. Metcalf.

CLEVELAND, O.—The Cleveland Electric Illuminating Company's heating franchise, once passed and once defeated, has again been passed by the city council, following a statement by Mayor Baker in which he favored the passage of the ordinance. Strong opposition had come from the labor organizations, especially the stationary engineers, on the ground that the action is contrary to the municipal pledge of the administration and also that it would throw a large number of stationary engineers out of work. Mayor Baker held that the city would not be in a position to extend municipal heating service in the downtown district for four or five years. A referendum petition is being circulated by the stationary engineers. It is necessary to secure 15,000 signatures in order to become effective and it will then be submitted to the people at a special election.

FOXBORO INDUSTRIAL
INDICATING AND RECORDING
THERMOMETERS

Are designed for All Ranges and All Purposes. They have been adopted by the largest and best engineering and manufacturing companies in the world. Send for Bulletins and let us tell you WHY

THE INDUSTRIAL INSTRUMENT CO.
New York: 50 Church St. **FOXBORO, MASS.** Chicago, Monadnock Bldg.



DETROIT CONDENSATION METER
(With Cover Removed)
"IT REVOLVES"

The Simplest, Most Accurate and Most Reliable Condensation Meter on the market.

Send for Catalogue No. 6

CENTRAL STATION STEAM CO.
Detroit, Michigan

J-M ASBESTOCEL
PIPE COVERING

is the most efficient covering for medium and low pressure steam and hot water heating systems, because it confines the largest amount of "dead air." It is built on the arch principle, The air cells are really sealed rings of dead air encircling the pipe, whereas, in ordinary longitudinal air-cell coverings they are cylinders or tubes running from end to end, allowing free circulation of air and resulting in radiation of heat.

Due to its arch construction, J-M Asbestocel is stronger than other low pressure coverings—will not break or crush down under weight and successfully withstands vibration and hard usage. Can be removed and replaced indefinitely.

Being made of asbestos, it is absolutely fire-proof. Prevents sweating and rusting of pipes.

Write our nearest Branch for Booklet.

H. W. JOHNS-MANVILLE CO.

Albany	Detroit	New York
Baltimore	Indianapolis	Omaha
Boston	Kansas City	Philadelphia
Buffalo	Los Angeles	Pittsburgh
Chicago	Louisville	San Francisco
Cincinnati	Milwaukee	Seattle
Cleveland	Minneapolis	St. Louis
Dallas	New Orleans	Syracuse

[1624]

The filing of the petition with the necessary number of signatures would hold up the ordinance until November, 1913.

PEORIA, ILL.—Building permits have been granted to the Peoria Gas & Electric Co., for the erection of two heating plants, one at the foot of Liberty St. and the other at the rear of the old National Hotel site. Each plant will cost $3,000.

J. B. BERNHARD has resigned as manager of manufacture for the Pierce, Butler & Pierce Mfg. Co., Syracuse, N. Y. Mr. Bernhard has lately been granted a patent on a new side feed boiler which, it is expected, will shortly be placed on the market.

E. F. DEAN, until recently superintendent of boiler construction for the United States Radiator Corporation, Detroit, Mich., has resigned to take the position of plant superintendent for the Pierce, Butler & Pierce Mfg. Co., Syracuse, N. Y. Mr. Dean for many years superintended the manufacture of the Hernedeen boilers, which are now made by the United States Radiator Corporation.

FRANK J. FEE, president of the National Association of Master Plumbers, has appointed the following board of directors for the ensuing year: A. C. Eynon, Canton, O.; W. H. Halsey, Milwaukee, Wis.; John Trainor, Baltimore, Md; Jeremiah Sheehan, St. Louis, Mo.; F. H. Gawthorp, Wilmington, Del.; Isaac J. Brown, New York; S. Louis Barnes, Philadelphia, Pa.; Robert E. Quinn, Paterson, N. J.; Carl J. Stein, Chicago, Ill.; Robert J. Welch, Lowell, Mass., and Thomas Haverty, Los Angeles, Cal. In addition to the foregoing the officers of the association are also members of the board.

NEW YORK FOLD, United Bunch of Sheep of America, held its first meeting of the fall season at Keen's Chop House, New York, October 25.

EASTERN SUPPLY ASSOCIATION held its annual meeting at the Hotel Astor, New York, October 9. The principal speaker was former Representative James T. McCleary, who made an address on the subject of the tariff. Mr. McCleary's remarks will be reprinted and distributed by the association. Among the new members elected was the H. W. Johns-Manville Co., New York. Officers for the ensuing year were elected as follows President, P. M. Beecher, Pierce, Butler & Pierce Mfg. Co., Syracuse, N. Y.; first vice-president, A. A. Tomlinson, Virginia-Carolina Supply Co., Norfolk, Va.; second vice-president, W. L. Blake, W. L. Blake & Co., Portland, Me.; treasurer, Martin Behrer, Behrer & Co., New York; secretary, Frank S. Hanley, New York. Board of Directors—P. M. Beecher,

Air Cooling by Contact

Explains the superiority of the

Thomas Acme Air Purifying and Cooling System

"AIR COOLING BY CONTACT" by multiple sheet sprays results in a clean, sweet and dry air. Nozzles that vaporize and volatilize the spray water, cooling by Saturation, result in a muggy, heavy, humid air.

OUR AUTOMATIC FLUSHING CONTROL is an added feature—piping and nozzles blown out periodically two to ten times an hour or oftener if desired.

We absolutely guarantee NOT to saturate the air—thus insuring a low normal humidity during summer ranging from 60 per cent. to 70 per cent. and NOT 90 per cent.

OUR AUTOMATIC HUMIDITY CONTROL does what we claim for it, and the cost of operation is not prohibitive.

Write for beautifully illustrated 80-page "ACME" Booklet.

THOMAS & SMITH, Inc.

CHICAGO, 104-106 Carpenter Street **NEW YORK, 416 Broadway**

IROQUOIS ENGINEERING CO., 1507 Fisher Building, Chicago
WESTERN DISTRIBUTORS

A. A. Tomlinson, W. L. Blake, Martin Behrer, G. R. Adams, Samuel Sloan & Co., Rochester, N. Y.; James F. Conran, Standard Sanitary Mfg. Co., New York; J. F. Evans, Wyoming Valley Supply & Manufacturing Co., Wlikes-Barre, Pa.; L. O. Koven, L. O. Koven & Bro., New York; James P. McPhail, The James Robertson Manufacturing Co., Baltimore, Md.; John A. Murray & Co., New York; F. T. Stevens, The Plimpton & Hills Corporation, Hartford, Conn. National Committee Representatives—J. Walter Lyons, Keystone Pottery Co., Trenton, N. J.; H. B. Hallett, Eastern Range Boiler & Welding Co, Conshohocken, Pa.; D. L. Hamill, D. L. Hamill Co., Buffalo, N. Y.; F. W. Hubbard, W. B. Hubbard & Sons Co., Boston, Mass.; S. E. Hunting, The Hunting Co., Watertown, N. Y.

EVANS, ALMIRALL & Co., New York, engineers and contractors, announce that P. A. Hoffman, sales manager of the New York branch of the B. F. Sturtevant Co., has become associated with their engineering sales department. The change became effective November 1.

MONASH-YOUNKER Co., Chicago, Ill., announces that D. H. Burnham & Co., architects, of Chicago, through their board of consulting engineers, have adopted the Monash noiseless system of vacuum heating for the Continental and Commercial Building in Chicago, which covers an entire city block. This is said to be the largest building of its type under one roof in the world. The Monash system was selected after a lengthy investigation by four experts appointed by the bank for that purpose, together with the architects and engineers.

Manufacturers' Notes.

JOSEPH DIXON CRUCIBLE Co., Jersey City, announces the following changes in its officers, made on account of the death of its vice-president, William H. Corbin: George E. Long, former treasurer, elected vice-president to succeed Mr. Corbin; J. H. Schermerhorn, former assistant secretary and assistant treasurer, elected a member of the board of directors and treasurer of the company; Albert Norris, elected assistant secretary and assistant treasurer.

ATLANTIC RADIATOR Co., Huntington, Pa., announces the removal of its general and executive offices from Philadelphia to Huntington, Pa., where the company's plant is located.

HACKNEY VENTILATING Co., manufacturers of the Hackney system of ventilation, has moved to Minneapolis from St. Paul, Minn.,

Confined spaces—low ceiling basements, etc., present no obstacle in connection with the installation of

"The Original Fan of the Many Blade Plan"

"Sirocco" TRADE MARK.

"Tested---Perfected and Patent Protected"

Fans for Heating and Ventilating

You get a double Profit—one from the resale of "Sirocco" and the other from duct work, etc.

AMERICAN BLOWER COMPANY
DETROIT, MICH.
U. S. A.

"Sirocco" reputation makes them half sold before you begin.

CANADIAN SIROCCO COMPANY, Limited. WINDSOR, ONTARIO MANUFACTURERS FOR CANADA

and has opened its factory in the Kinney Mfg. Co.'s building at Twelfth Ave., South and Third St. The company is arranging to build a plant of its own in Minneapolis.

AMERICAN RADIATOR CO., Chicago, has commenced work on the addition to its new factory in Kansas City, Mo., at Twelfth St. and Eastern Ave. The addition will be one-story, of brick, steel and concrete construction and will cost $110,000. It will be completed by May, 1913. The Worden-Allen Co. is the builder.

INTERNATIONAL HEATER CO., Utica, N. Y., announces the election of Irving L. Jones as treasurer of the company, succeeding F. H. Moore, who is engaged in the reorganization of the McCrum-Howell Co. Robert J. Clift has been appointed manager of the New York City branch, succeeding John K. Simpkins, who has been appointed eastern sales manager, with headquarters at Utica. Walter Jones has been named as superintendent of manufacturing at the company's plant in Utica. All of the appointees are men who have long served with the company.

J. H. WILLIAMS CO., Brooklyn, N. Y., manufacturers of drop-forged wrenches and other specialties, has opened a branch office and warehouse in Chicago at 40 South Clinton st.

PLATT IRON WORKS, Dayton, O., has been reorganized, the new interests having taken over all the physical assets, as well as the inventory and accounts receivable from the trustees on September 30. The company starts with a working capital of $700,000. Its preferred stock is $1,100,000 and its common stock, $1,000,000. The company also has outstanding $700,000 in 6% 20-year gold bonds. The new board of directors is as follows: Chairman, Waddill Catchings, president of the Central Foundry Co., New York; George W. Davison, vice-president of the Central Trust Co., New York; Albert Rathbone, Joline, Larkin & Rathbone, attorneys, New York; E. F. Platt, vice-president and treasurer of the company; J. B. Reichmann, president of the company. The officers, in addition to those named are: Vice-president, J. F. Hartlieb; secretary, John Sturgess. The company is planning to spend $50,000 in improvements on its plant, some of which are now under way.

SHIRLEY RADIATOR & FOUNDRY CO., Beech Grove, Indianapolis, Ind., announces that its president, Robert Martindale, has retired from active participation in the management of the business and will be succeeded in the management by Fred W. Smith, who has been active in the recent development of the company.

The

Sturtevant

REG. U. S. PAT. OFF.

Multivane Fan

In the construction of the Sturtevant Multivane Fan every detail, from the rigid riveting of the blades and the strong construction of the spider to the accurate balancing of the fan wheel, has been made the subject of careful study and experiment. The experience of years of fan building has been used to develop a fan rigid and durable, as well as of high efficiency.

Durability is one of the principal features of the Sturtevant Multivane Fan.

B. F. STURTEVANT COMPANY

HYDE PARK, BOSTON, MASS.

AND ALL PRINCIPAL CITIES OF THE WORLD 882

CENTRAL SUPPLY ASSOCIATION held one of the largest gatherings in its history when it met in Chicago, October 23, for its eighteenth annual meeting. One hundred and sixty-seven members were present. Harry A. Wheeler, president of the Chamber of Commerce, Chicago, addressed the meeting on the subject of modern business problems, such as state and federal regulation of domestic commerce, tariff, and currency and banking laws. The officers were re-elected as follows:

Officers: President, William Ivy; first vice-president, P. J. Frey; second vice-president, C. V. Kellogg; treasurer, E. F. Niedecken; Secretary, Paul Blatchford.

Executive Committee: William Ivy, P. J. Frey, C. V. Kellogg, E. F. Niedecken, George H. Gorton, E. A. Morris, A. A. Merkel, J. B. Rahm, C. A. Carothers.

National Committee: Members—J J. Ryan, W. A. Myler, John F. Wolff, F. D. Keeler, George H. Bailey. Alternates—A. B. Pierce, M. J. O'Fallon, H. M. Hoelscher, A. A. Merkel, A. Y. McDonald.

New Firms and Business Changes.

AMERICAN MACHINE & MFG. Co., Greensboro, N. C., has taken over the heating contracting business of D. McKenzie, of that place.

W. H. MCCORNACK, Elgin, Ill., has purchased the heating and plumbing business of H. L. E. Peterson, at that place. Mr. McCornack was formerly in the employ of Mr. Peterson.

GREENFIELD TAP & DIE CORPORATION, Greenfield, O., a holding company which controls the stock of the Wiley & Russell Mfg. Co., and the Wells Bros. Co., manufacturers of dies and pipe threading machinery, has acquired the entire stock of the A. J. Smart Mfg. Co., makers of taps, dies and screw plates. The company will be continued as a separate organization, with the following officers: President, F. O. Wells; vice-president, Rollin S. Bascom; treasurer, F. H. Payne.

H. F. FIX HEATING AND VENTILATING Co., 1522 Olive St., St. Louis, Mo., is a new contracting firm in this line. L. A. Gibson, well known to the trade in St. Louis, is the superintendent of the company.

CLEVELAND SANITARY PLUMBING & HEATING Co., CLEVELAND, O., has opened a display room and office at 1022 East 105th St. Earle A. Foster is the manager.

Business Troubles.

LOCKE & SMITH Co., New York, jobbers of heating and plumbing supplies, has failed, with liabilities of $56,500 and assets of $30,000. James F. Conran has been appointed receiver.

New Incorporations.

COLUMBIA HEATING Co., Indianapolis, Ind., capital, $15,000, to manufacture heating devices. Directors, H. H. Buckman, Jr., O. M. Ragsdale and L. E. Lathrop.

UNITED STATES SAFETY GAS VALVE Co., Philadelphia, Pa., capital, $350,000, to manufacture automatic cut-off valves and fittings. Incorporators, F. R. Hansell, Philadelphia; George H. B. Martin and S. C. Seymour, Camden, N. J.

ECONOMY WATER HEATER Co., St. Louis, Mo., capital, $50,000, to manufacture hot-water heaters. Incorporators, Lee J. Baver, F. W. Maury and John W. Ellebrecht.

NEPO SUPPLY Co., Cleveland, O., capital, $10,000, to deal in heating and plumbing supplies. Incorporators, E. N. Ullrey, B. F. Koch, E. J. Bryant, W. C. Grant and L. R. Clawson.

J. D. DENSMORE Co., Toledo, O., capital, $10,000, to conduct a heating and plumbing business. Incorporators, J. D. Densmore, John L. Hodge, Fred Gruber, Jack Gallagher and William Gellerd.

SAFFORD RADIATOR Co., Detroit, Mich., incorporated under the laws of Delaware with a capital stock of $10,000,000 to manufacture sheet metal radiators, heaters, boilers, furnaces and steam-fitting appliances. Incorporators, Clarence E. Safford, Frank E. Singer, Jere T. Purdy, all of Detroit. The company's charter was filed at Dover, October 8.

CONSOLIDATED PLUMBING & HEATING Co., West New York, capital, $15,000. Incorporators, Abraham Hurwitz, Benjamin A. Rosen and Harry German.

BATTERMAN BLOWER Co., Chicago, capital, $5,000, to manufacture and deal in heating and ventilating apparatus. Incorporators, F. W. Batterman, H. E. Batterman and B. G. Neville.

STANDARD PLUBMING & HEATING Co., Salt Lake City, Utah, capital stock, $10,000. President, C. W. Kennicott; vice president, O. A. Wilson; secretary and treasurer, Mary Clayton.

ECKELS LIGHT, HEAT & POWER Co., Conneautville, Pa., capital, $15,000. Incorporators, Frank C. Eckels, Conneautville, Pa.; Maggie Eckels, Conneautville, Pa.; Clarence P. Paisley, Wilkinsburg, Pa., and Harry G. Glass, Kansas City, Mo.

HIETT VENTILATING AND ENGINEERING Co., Chicago, capital, $10,000, to manufacture and deal in ventilating apparatus. Incorporators, Elmer A. Roat, John T. Booz and Peter C. King.

HUDSON BOILER MFG. Co., 27 West 42d St., New York, has been incorporated to man-

ufacture the Hudson line of heating boilers and also to conduct a jobbing business in heating and plumbing supplies. The organizers of the new company were formerly associated with the McCrum-Howell Co., of New York. As announced last month, the officers are: President, Herbert T. Gates; secretary and treasurer, George L. Greenman. Others associated with the new company are Edward E. Fox, James D. Brady and B. F. Lane.

RAUTMAN PLUMBING & HEATING CO., Seattle, Wash., capital, $20,000. Incorporators, S. E. Rautman, E. H. Norton and A. E. Ayers.

LUNDWALL-BOOKER CO., Helene, Mont., capital, $10,000, to conduct a heating and plumbing business. Incorporators, C. Booker, E. H. Lundwall, and others.

JOHN T. SADLER CO., Elmira, N. Y., capital, $20,000, to take over the heating and plumbing business heretofore conducted by John T. Sadler. Incorporators, William J. Friedie, Robert E. Bentley and John T. Sadler.

ROCHESTER HEATING & ELECTRICAL CO., Rochester, N. Y., capital, $10,000. Incorporators, Cyrus S. Hood and Robert H. Hood, Corning, and A. H. K. Woodcock and William G. Woodcock, Rochester.

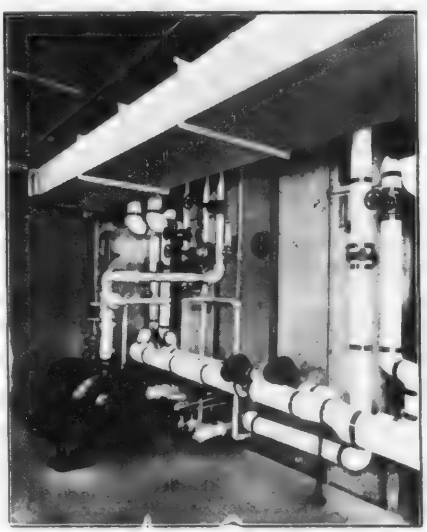
SKINNER BROS. MFG. CO., St. Louis, Mo., capital, $25,000, to manufacture exhaust and ventilating fans and dust collecting apparatus for wood working factories. Incorporators, Charles N. Skinner, New Orleans, La.; Daniel R. Skinner, Fred A. C. Skinner and Merrill G. Skinner, all of St. Louis.

CLEVELAND SANITARY PLUMBING & HEATING CO., Cleveland, O., incorporated to engage in a heating and plumbing supply business. Incorporators, J. C. Foster, J. W. Pulford, John E. Ordell, William S. Gilbert and George H. Bellman.

E. H. ALLEN CO., Boston, Mass., capital, $10,000, to install ventilating systems. Incorporators, Eli H. Allen, Boston, and A. B. Fagan, Brighton.

OPELOUSAS PLUMBING CO., Opelousas, La., capital, $10,000. Incorporators, William J. Sandoz, president; Alex L. Chisholm, vice president; L. H. Morningveg, secretary-treasurer.

H. MUELLER PLUMBING & HEATING CO., Newark, N. J., capital, $25,000. Incorporators, Henry Mueller, J. Lee Chenoweth and Clifford L. Bailey.



WEBSTER AIR WASHER WITH HUMIDITY CONTROL
Springfield (Mass.) Intl. Y. M. C. A.

"The Webster" Method of Humidity Control

is simple, practical and effective and may be applied to **WEBSTER STANDARD** and **TYPE "A" AIR WASHERS** at but little additional cost.

It requires simply the application of ordinary thermostatic devices with which all engineers and architects are familiar.

When considering an Air Washer specify **WEBSTER AIR WASHER** with **HUMIDITY CONTROL.** Specification forms furnished upon request.

The acknowledged leader in the field---a type of apparatus designed and built for each specific purpose:

AIR CLEANSING **VAPOR CONDENSATION**
DE-HUMIDIFYING **AIR COOLING**
DUST REMOVAL **COOLING OF LIQUIDS**
RECLAIMING OF MATERIALS

Warren Webster & Company

Established 1888 **CAMDEN, N. J.** **24 Branch Offices**

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

Contracts Awarded.

PORTSMOUTH HEATING & PLUMBING Co., Portsmouth, N. H., equipping city hall with new boilers.

CARSTEN BROS., Ackley, Ia., heating Windsor Opera House block at that place.

S. A. CARNES, Laurel, Miss., heating new girls' dormitory at the Agricultural High School at Jackson, also the two completed buildings, for $7,525. The Webster nodulation system will be used.

WILLIAMSON-NICHOL Co., Eugene, Ore., hot blast heating for Central School at Eugene.

D. T. RIFFLE, Pittsburg, Pa., three-room brick heating plant near Boggs Ave., at the south end of Mt. Washington tunnel, for the Pittsburg Railways Co. The work will cost $3,500.

T. T. WELDIN & SON, Wilmington, Del., were the lowest bidders, at $2,799, for the heating of School No. 30 on the Boulevard.

LEWIS & KITCHEN, Kansas City, Mo., heating and ventilating manual training school at Meridian, Miss., for $9,860. Other bidders included Sodeman Heating & Plumbing Co., St. Louis, $9,470.

ASBURY PARK, N. J.—Bids for the heating and ventilation of the Bangs Avenue School have been received as follows: Walters, Purks & Mellon, Philadelphia, $16,985 on a steam system, with direct and indirect radiation, furnishing its own power for operating the fans; American Heating and Ventilating Co., Philadelphia, $15,545 on a hot-air system, and B. S. Harrison, New York, three propositions on a warm-air system, one at $13,000, one at $12,000 and one at $8,500.

C. H. GEORGE, Yoakum, Tex., steam heating high school building at Yoakum for $3,496, the work to be completed by December 1.

G. W. ENSLEY, Chariton, Ia., steam heating C. B. & Q. depot at Chariton.

E. L. DEZENDOFF, New Orleans, La., heating, plumbing, lighting and vacuum cleaning new model school building at the State Normal School, Natchitoches, La., for $10,000.

E. M. LINK MACHINERY Co., Erie, Pa., heating and ventilating factory of the J. W. Witten Mfg. Co., at Bolton, England.

THOMAS HEATING Co., Racine, Wis., heating factory buildings of the International Harvester Co., at Springfield, O., for $15,000.

TOPEKA, KAS.—Conklin & Gustafson, Topeka, were awarded the contract for the heating and ventilating system in the Potwin School at their bid of $3,647.57. The heating contract for the Quinton School went to the A. B. Mueller Co., Kansas City, Mo., at $2,063. Other bids were:

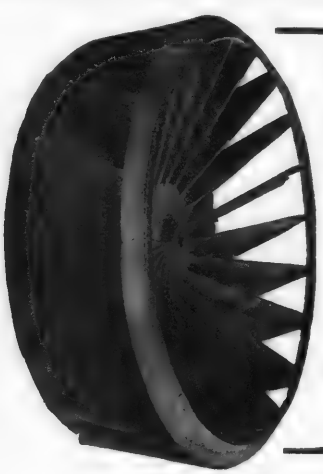
	Potwin.	Quinton.
W. F. Sheeahan.....	$4,500	$2,489
Lewis & Kitchen.....	4,763	2,243
Conklin & Gustafson...	.....	2,735
Johnson & Beck.....	4,875	2,775
A. B. Mueller Co.....	4,770	.....

HANLEY-CASEY Co., Chicago, heating contract for the new $6,000,000 Continental and Commercial National Bank Building in Chicago. This is said to be the largest office building in the country outside of New York. American radiators will be used.

COLUMBUS HEATING & VENTILATING Co., Columbus, O., heating new high school at Benwood, W. Va., also new school at Natrona, Pa.

WELCH BROS., Lowell, Mass., heating Casino at Lowell for $5,000.

M. J. DUGGAN, Holyoke, Mass., heating new engineers' headquarters of the water works on Commercial St.



Not a Bird Cage, a Squirrel Cage, a Rat Trap or a Skyrocket—but—

A Cycloidal Fan or Blower

for all purposes. The only radical improvement in fans in forty years. Takes up less room, runs at slower speed, requires less power, noiseless in operation.

We guarantee our Cycloidals to equal in capacity any fan built—We bar none—with from 20 to 25 per cent. less speed and power. We build them in all sizes to suit all conditions—hundreds of them in use—not "as good—but better."

GARDEN CITY FAN CO.

Patentees and Sole Manufacturers

1532 McCORMICK BUILDING CHICAGO

Established 1879

Eastern Sales Agent, L. J. Wing Mfg. Co., 352 W. 13th St., New York

Send for Catalogs 110 and 120, just issued

Birmingham, Ala., Office, 401 Woodward Bldg.

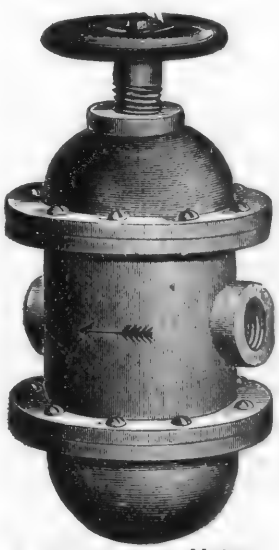
Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

If You Have Valve Troubles

or are erecting a new installation, you want to know about the JOHNSON line of reducing valves. They were designed and are manufactured to pass the rigid inspection required of everything that carries the JOHNSON name.

For years we have been making valves for places where the ordinary kind would not do the work. Sticking, binding and wearing-out are unknown to the valves that carry the JOHNSON Trade Mark.

The prices as well as the valves are right.

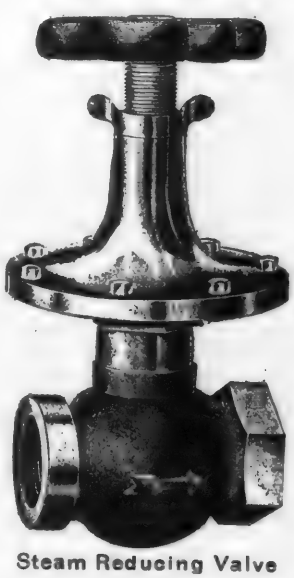


Air Regulating Valve

Johnson Service Co.

MILWAUKEE, WIS.

Branches Everywhere



Steam Reducing Valve

POWELL & DROSTE, Anderson, Ind., steam heating, plumbing and wiring of A. Weslaw building at Anderson.

HATTERSLEY & SON, Fort Wayne, Ind., heating new DeKalb County courthouse for $18,616. One other bid was submitted by the Carson-Payton Co., Danville, $19,700.

COLUMBUS MACHINE WORKS, Columbus, Ind., steam heating and plumbing school building at Whiteland for $10,500.

GEORGE SEARS & Co., Bedford, Ind., heating and plumbing Edinburg School and school at Malott for $10,0000.

BURKE BROS., Gary, Ind., heating and plumbing Hames office building at Gary.

PEOPLE'S HARDWARE Co., Gary, Ind., heating and plumbing the Blumenthal Turkish Baths, at Gary.

J. F. MCCAFFREY Co., Pawtucket, R. I., heating new armory at Woonsocket, R. I., for $3,875; the plumbing contract went to E. J. Sullivan, Providence, at his bid of $3,820. Other bids for the heating work were as follows: Dennis McCarthy, Providence, $4,668; Samuel Jackson, Pawtucket, $4,644; Dexter Engineering Co., Providence, $4,300; J. P. Dwyer, Boston, $4,265; Haslam Heating & Ventilating Co., Providence, $5,414; William H. Spaulding, Saylesville, $4,230.

WILEY & CALHOUN, Portland, Me., central plant for heating high school and library buildings at Bangor to cost $22,000; the plumbing contract went to C. H. Babb & Co., Bangor.

GENERAL ENGINEERING Co., San Francisco, Cal., vacuum cleaning plant for the new St. Ignatius Roman Catholic Church, to cost $2,797.

KIERNAN & O'BRIEN, San Francisco, Cal., steam heating six-story and basement Faxon Building on Mission Street, for $2,065.

SULLIVAN PLUMBING & HEATING Co., Bay City, Mich., heating Commercial Bank Building at Bay City for $3,000.

HIGGINS & Co., Pittsburg, Pa., heating new parochial school and chapel for St. Paul's Cathedral, Pittsburg.

BARTLEY-KENNEDY Co., Pittsburg, Pa., laundry equipment and power plant for the Montefiore Hospital at Pittsburg.

HENNESSEY BROS., Oswego, N. Y., heating, ventilating and plumbing St. Francis Orphanage at Oswego for $7,000; also heating and plumbing Tuberculosis Hospital at Orwell, N. Y., for $6,000.

W. H. ROGERS, Salem, Ore., heating new addition to the State School for the Feeble Minded, at Salem, for $2,208.

F. B. THOMAS & Co., Albany, Mo., heating Gentry County Court House at Albany.

J. M. ROBB & Co., Wadena, Minn., heating and ventilating new high school at McIntosh, Minn., for $8,000.

M. J. HAWKINS, Albany, N. Y., hot-water heating Industrial Building at St. Vincent's Male Orphan Asylum, at Albany, for $5,700; also heating, ventilating and plumbing Grand Theatre, Albany, for $20,000; also installing vacuum steam heating systems in St. Joseph's Roman Catholic Church for $14,000 and in the new Elks' Club House for $9,000.

J. J. HORAN & Co., Troy, N. Y., steam heating State Hospital at Central Islip, L. I.

ROYAL STEAM HEATING Co., Westminster, Mass., heating and ventilating new school building at Westminster.

J. P. RYAN, Easthampton, Mass., steam heating Barnett & Lynch's new block at Easthampton.

BRAMAN, DOW & Co., Worcester, Mass., heating George H. Ward Memorial Building at Worcester.

JAMES H. O'LOUGHLIN, Cranston, R. I., steam heating Lippitt School at Cranston.

J. J. COTTER Co., Springfield, Mass., steam heating and plumbing North Street Engine House at Springfield for $6,000; also heating and plumbing, Lerche's Hotel, on State Street, for $4,000.

FORT DODGE HEATING & PLUMBING Co., Fort Dodge, Ia., vacuum heating system for the Riverside School at West Fort Dodge, to cost $3,746.

W. H. HOPSON Co., New London, Conn., heating new city hall at New London for $3,030; other bids were: Jordan & Cleary, $3,483; Newman Bros., $3,431, and Harry Kennedy, $3,315. The plumbing contract went to Roche & McGuire at their bid of $3,367.55.

HEALY PLUMBING Co., St. Paul, Wash., plumbing contract for the new shops of the Northern Pacific Railroad at Parkwater, Wash., amounting to $51,482.

Until Nov. 21, 1912, for the mechanical equipment, except plumbing and elevators, of the United States Barge Office at New York.

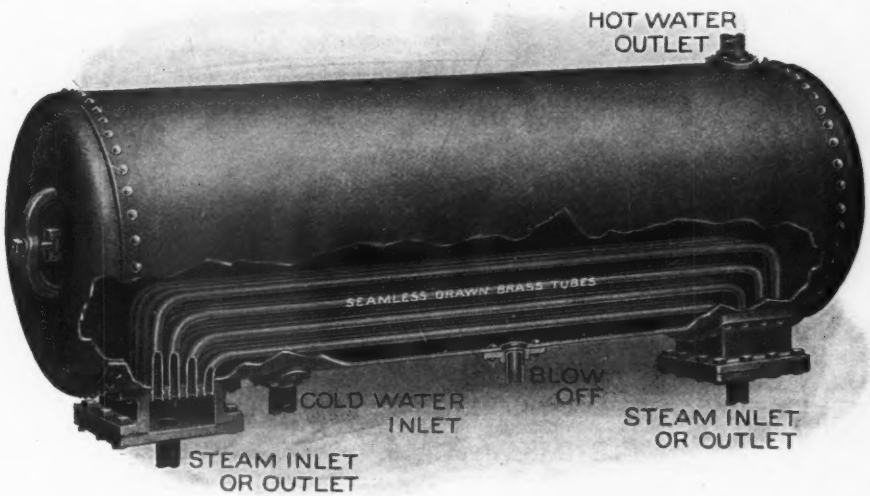
Until Nov. 27, 1912, for the construction complete, including plumbing, gas piping, heating apparatus, electric conduits and wiring, etc., of the United States Post Office at Beloit, Kas. One story with mezzanine and basement. Ground area, approximately 3,800 sq. ft.

Until January 2, 1913, for the construction, including plumbing, gas piping, heating apparatus, electric conduits and wiring, etc., of the United States Post Office at Morgantown, W. Va. Two stories and basement. Ground

PATTERSON
HOT WATER TANK

the practical improvement upon the old style tank and coil.

Boiler Plate Shells, Heavy Seamless Drawn Brass Tubes. For use with exhaust or live steam, or low pressure boilers.



There is no idle heating surface in Patterson Plumbers' Tank Heaters. The steam enters the large expansion chamber, expands and uniformly fills the large number of "∩" shaped tubes of small diameter the area of which is much greater than of the steam inlet pipe. As fast as the steam condenses in transmitting its heat to the surrounding water, this condensation is discharged to the condensation chamber and flows by gravity back to the boiler.

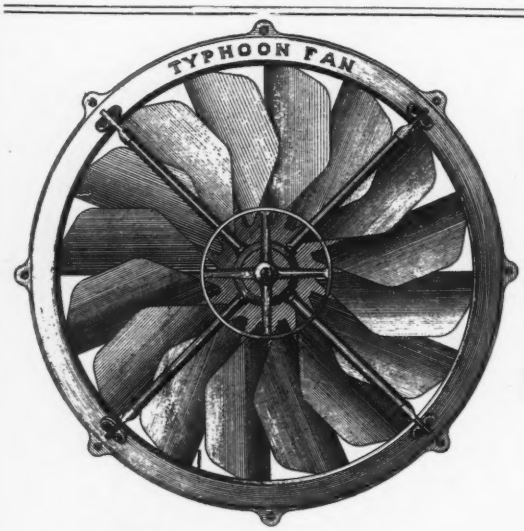
In the ordinary tank where a coil or return bend is used of the same area or size as the steam inlet pipe, its heating efficiency is rapidly destroyed, due to its being filled up by the water of condensation which forms more rapidly than it can be discharged through the single pipe.

Patterson Heaters never create back pressure. The tubes never leak. The heads never blow out.

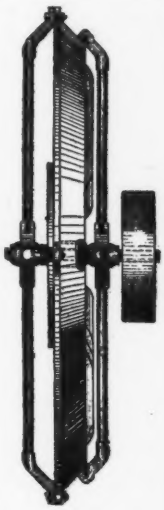
FRANK PATTERSON & CO.

26 CORTLANDT STREET
NEW YORK

TYPHOON FANS



Made in All Sizes From 12 Ins. to 12 Feet



While Blower Manufacturers were asleep an Englishman with an unusual name discovered that blowers having wheels with many narrow blades were more powerful and efficient than one with wider and fewer.

Of course he could not patent the idea, but he did the next best. He designed a wheel in which some minor details were patentable or, at least, of so little importance that nobody contested the validity of the patent. Incidentally, this wheel was provided with a large number of narrow blades. The Blower Manufacturers woke up and are now building that style of a fan.

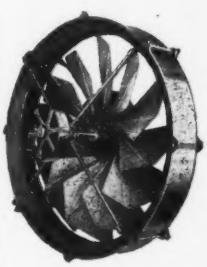
The multiple blade idea applies likewise to the propeller type of fans and we have taken advantage of it in designing **THE TYPHOON** fans, besides incorporating a few additional advantages.

Up-to-date Heating Engineers have concluded that better and surer results are obtained by dividing up the Ventilating System into several small units, thereby obviating uneven distribution of air on account of the different exposures of a building.

The **TYPHOON FAN** is particularly adapted to such unit systems and is built with a number of blades of a width and pitch to meet any special requirement.

SPECIAL PRICE LIST

Diameter of Fan	Revolutions per Minute	Capacity per minute in Cubic Feet	PRICE	
			Standard	Standard Brick Set
30 in.	325-650	4570- 9139	$32.50	$40.00
36 "	275-550	6683-13365	40.00	50.00
42 "	235-470	9070-18137	50.00	60.00
48 "	200-400	11520-23040	60.00	75.00
54 "	175-350	14352-28704	75.00	92.50
60 "	165-330	18562-37125	92.50	110.00
72 "	135-270	26244-52488	125.00	150.00



Brick Set Type

DISCOUNTS ON APPLICATION

TYPHOON FAN COMPANY

Telephone, 8133 8134 Bryant — **1544 Broadway, New York**

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*